

VOLUME 11

Pages 2612 - 2905

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

Before The Honorable YVONNE GONZALEZ ROGERS, Judge

EPIC GAMES, INC.,)	
)	
Plaintiff,)	NO. C-20-5640 YGR
)	
vs.)	Monday, May 17, 2021
)	
APPLE, INC.,)	Oakland, California
)	
Defendant.)	BENCH TRIAL
)	
APPLE, INC.,)	
)	
Counterclaimant,)	
vs.)	
)	
EPIC GAMES, Inc.,)	
)	
Counter-Defendant.)	
)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

APPEARANCES:

For Plaintiff: CRAVATH, SWAINE & MOORE, LLP
825 Eighth Avenue
New York, New York 10019
BY: KATHERINE B. FORREST, ESQUIRE
GARY A. BORNSTEIN, ESQUIRE
YONATAN EVEN, ESQUIRE
(Appearances continued.)

Reported By: Diane E. Skillman, CSR 4909, RPR, FCRR
Pamela Batalo-Hebel, CSR 3593, RMR, FCRR
Raynee Mercado, CSR 8258 RMR, CRR, FCRR

TRANSCRIPT PRODUCED BY COMPUTER-AIDED TRANSCRIPTION

For Plaintiff: CRAVATH, SWAINE & MOORE, LLP
825 Eighth Avenue

New York, New York 10019

BY: LAUREN A. MOSKOWITZ, ESQUIRE
JUSTIN C. CLARKE, ESQUIRE
W. WES EARNHARDT, ESQUIRE
BRENDAN BLAKE, ESQUIRE
JIN NIU, ESQUIRE
BRENT BYARS, ESQUIRE

For Defendant:

GIBSON, DUNN & CRUTCHER
333 South Grand Avenue
Los Angeles, California 90071

BY: RICHARD J. DOREN, ESQUIRE
DAN SWANSON, ESQUIRE
CYNTHIA RICHMAN, ESQUIRE
RACHEL BRASS, ESQUIRE

GIBSON, DUNN & CRUTCHER, LLP
2001 Ross Avenue, Suite 1100
Dallas, Texas 75201

BY: VERONICA S. MOYE, ESQUIRE

PAUL WEISS RIFKIND
WHARTON & GARRISON LLP
2001 K STREET, NW
Washington, DC 20006

BY: KAREN DUNN, ESQUIRE
JESSICA E. PHILLIPS, ESQUIRE

For Defendant:

PAUL WEISS RIFKIND
WHARTON & GARRISON LLP
943 Steiner Street
San Francisco, California 94117

BY: ARPINE LAWYER, ESQUIRE

Plaintiff's Witness:**Page****Vol.****Mickens, James**

Cross-examination by Mr. Lo

2629

11

Redirect Examination by Mr. Clarke

2692

11

Recross-examination by Mr. Lo

2708

11

Defendant's Witness:**Page****Vol.****Schiller, Philip**

Direct Examination by Mr. Doren

2713

11

Defendant's Exhibits:**Evd.****Vol.**

3426

2721

11

4192

2783

11

4287

2750

11

4566

2731

11

4608

2846

11

5555

2830

11

5561

2666

11

5562

2649

11

5627

2826

11

1 Monday, May 17, 2021

8:00 a.m.

2 P R O C E E D I N G S

3 o0o

4 **THE CLERK:** All rise. Court is in session.

5 Honorable Yvonne Gonzalez Rogers presiding.

6 **THE COURT:** Good morning everyone.

7 **MR. DOREN:** Good morning, Your Honor.

8 **MS. FORREST:** Good morning, Your Honor.

9 **THE CLERK:** You may be seated.

10 Calling civil action 20-5640 Epic Games, Inc. versus
11 Apple, Inc.

12 Counsel, please state your appearances and your mics are
13 on at the table.

14 **MS. FORREST:** Good morning, Your Honor. Katherine
15 Forrest for Epic.

16 **THE COURT:** Good morning.

17 **MR. BORNSTEIN:** Good morning. Gary Bornstein for
18 Epic.

19 **MR. CLARKE:** Good morning. Justin Clarke for Epic.

20 **MS. KLOSS:** Good morning, Your Honor. Lauren Kloss
21 for Epic.

22 **MS. CHOI:** Good morning, Your Honor. Jessica Choi
23 for Epic.

24 **THE COURT:** Okay, Ms. Choi, welcome to the courtroom.

25 **THE CLERK:** Sorry. I will turn your mic on, Your

1 Honor.

2 **THE COURT:** Ms. Choi, welcome to the courtroom.

3 **MS. CHOI:** Thank you, Your Honor.

4 **THE COURT:** Mr. Sweeney, good morning.

5 **MR. SWEENEY:** Good morning, Your Honor.

6 **THE COURT:** Mr. Rudd, good morning.

7 **MR. RUDD:** Good morning.

8 **THE COURT:** Okay. On the Apple side.

9 **MR. DOREN:** Good morning, Your Honor. Richard Doren
10 for Apple.

11 And we're joined this morning by Heather Grenier, the head
12 of commercial litigation, and Kate Kaso-Howard, from Apple,
13 in-house counsel.

14 **THE COURT:** Who is the other one from Apple?

15 **MR. DOREN:** Kate Kaso-Howard.

16 **THE COURT:** So this is a new person.

17 **MR. DOREN:** Yes.

18 **MS. KASO-HOWARD:** Good morning. Good morning.

19 **MR. LO:** Good morning, Your Honor. Jason Lo --

20 **THE COURT:** Hold on a minute. The middle name -- I
21 got Kate and I got Howard.

22 **MS. KASO-HOWARD:** K-A-S-O.

23 **THE COURT:** K-A-S-O. Okay. Good morning.

24 Sir.

25 **MR. LO:** Good morning, Your Honor. Jason Lo on

1 behalf of Apple.

2 **THE COURT:** New to the courtroom too, Mr. Lo. Good
3 morning.

4 **MR. LO:** Good morning.

5 **MS. RHO:** Good morning, Your Honor. Jennifer Rho for
6 Apple.

7 **THE COURT:** Also new. Good morning.

8 **MS. RHO:** Good morning.

9 **THE COURT:** Okay. Then we have Mr. Eltiste in the
10 back. Yes?

11 Good morning. I see Ms. Dunn. I see -- who else is back
12 there? Mr. Phillips, is it?

13 **MR. PHILLIPS:** Yes.

14 **THE COURT:** Is that Mr. Srinivasan?

15 **MR. SRINIVASAN:** Yes.

16 **THE COURT:** Good morning.

17 So on -- also in the gallery we have today Ms. Griffith
18 from the *New York Times*.

19 **MS. GRIFFITH:** Hi.

20 **THE COURT:** Good morning.

21 So we have now restarted, I take it? You were with us on
22 day one?

23 **MS. GRIFFITH:** Yes.

24 **THE COURT:** And then Elizabeth Lopatto from *Verge*.
25 Good morning.

1 **MS. LOPATTO:** Good morning, Your Honor.

2 **THE COURT:** And then I have Mr. Manfredi?

3 **MR. MANFREDI:** Good morning, Your Honor.

4 **THE COURT:** From Saveri & Saveri?

5 **MR. MANFREDI:** Yes.

6 **THE COURT:** I see one more person. Ah, that's our
7 witness.

8 **THE WITNESS:** Good morning, Your Honor. I'm indeed
9 the witness.

10 **THE COURT:** Good morning, Professor Mickens.

11 Okay. Let's go ahead, Ms. Forrest, and you can begin us
12 off this morning if there are issues.

13 I saw, obviously, filings over the weekend. I just posted
14 an order this morning. So that hopefully gives some guidance
15 and resolves an issue.

16 Ms. Forrest, let's start with you.

17 **MS. FORREST:** Yes, Your Honor, good morning.

18 We have what I would call two buckets of issues. I'll
19 handle the first which has to do with some logistics. The
20 second will be relating to the expert written directs, and
21 that will be handled by Mr. Bornstein from our side.

22 **THE COURT:** Okay.

23 **MS. FORREST:** On the first bucket, it's logistics.
24 When we are at the point where we are -- no longer have any
25 witnesses in our affirmative case, which will be after

1 Mr. Mickens, there will be a couple of outstanding issues that
2 will prevent a formal sort of "we rest." And I just wanted to
3 alert the Court to what they will be.

4 **THE COURT:** Okay.

5 **MS. FORREST:** One is, for the deposition designation
6 final binder, we have gotten a small number of counters from
7 Apple. We are just running these together. We got them, you
8 know -- it will be today. We will get it to you. So that
9 will be sometime today.

10 The second piece is, there is an evidentiary stipulation
11 relating to a small number of documents close to being
12 finalized.

13 The third is that there are some witnesses that are in
14 Apple's case that we had called in our case and there are some
15 comments and evidence that we would be relying upon. That's
16 Mr. Gray, Federighi, and Schmid.

17 **THE COURT:** You said Schmit?

18 **MS. FORREST:** Schmid.

19 **MR. DOREN:** S-C-H-M-I-D, Your Honor.

20 **THE COURT:** Okay.

21 **MS. FORREST:** If Mr. Gray is not called because he's
22 now on the may-call list, the parties have agreed that we
23 could put in an additional, I think it's only 15 minutes of
24 deposition designations.

25 **THE COURT:** Okay.

1 **MS. FORREST:** Also we are going to reserve some time
2 for the possibility of some rebuttal evidence, if needed.

3 **THE COURT:** Okay.

4 **MS. FORREST:** That, I think, is sort of the
5 logistics. There's one other piece, which is we wanted to
6 inform Your Honor that for the closing agenda on the back and
7 forth, the point/counterpoint, we are super close is the
8 phrase that was used, to having an agreement between the
9 parties on what that would be and would be prepared to submit
10 that later today.

11 Then the last question for Your Honor is, do we need to
12 reserve the time for that closing point/counterpoint from our
13 time, which we are happy to do, or will that be out of time?
14 It just helps us plan the week, Your Honor.

15 **THE COURT:** I haven't checked. The last time I
16 checked, we weren't set to close in just in terms of sheer
17 time until Monday.

18 **MR. DOREN:** Agreed.

19 **THE COURT:** And that's my concern. So I'd really
20 like to finish off on Monday. And I don't mind doing a full
21 day on Monday, that is, I don't mind adding a bit of time so
22 that we can do this. Because, as I said, I really didn't
23 think you would take me up on my offer, but I would find it to
24 be helpful.

25 So I'm happy to do the day Monday. I am not inclined to

1 give you any more time if that means we roll into Tuesday.
2 Monday I'm good; Tuesday I'm not good.

3 **MS. FORREST:** Understood, Your Honor. I think the
4 parties are all assuming that we are done Monday.

5 **MR. DOREN:** I agree with that, Your Honor.

6 **THE COURT:** Okay.

7 I will also say that when I do it in the patent context, I
8 never go over three hours. It's basically -- you know, it
9 ends up being about an hour and a half for each side. As you
10 may know, Ms. Forrest, I don't know what your practice was.

11 I only allowed 10 terms. So I tell the parties we start
12 with the most important, and if you run out of time, you run
13 out of time. But for me, three hours is about the max that
14 I'm interested in.

15 **MR. DOREN:** Very good.

16 **MS. FORREST:** Very well.

17 **MR. DOREN:** Thank you.

18 **THE COURT:** With respect to the closing, you know,
19 typically that's important in -- because we receive defense
20 motions at the close. As I'm sure you know, it is -- most
21 trial judges will not grant those motions, will let the
22 defense case come in, and then resolve everything at the end.

23 So I don't know whether there was a consideration of
24 making such a motion, Mr. Doren, and how that impacts given
25 these logistics, but I can tell you, given the heavy disputes

1 on both sides, I would not grant a motion without hearing all
2 of the evidence and resolving it at the end.

3 The only exception might be and I would like to -- is this
4 essential facility question. I mean, the expert -- your
5 expert unequivocally stated that he did not believe that this
6 was appropriate. I don't know how I could grant that -- a
7 theory of that even though I was curious whether it might
8 work, without some expert testimony on that issue, and neither
9 side -- neither side's primary economic expert says that
10 that's appropriate for this case. So that might be the only
11 one that I would think about.

12 **MS. FORREST:** Well, Your Honor, if -- I'll await
13 whether Mr. Doren intends to move on that, but we would have
14 something to say on that depending upon the bases on which
15 Mr. Doren moved.

16 **THE COURT:** Okay.

17 **MR. DOREN:** Your Honor, I would just say that was one
18 claim that we were considering a motion on. So that motion
19 may be forthcoming.

20 **THE COURT:** Again, I might -- I'm not sure that I
21 would necessarily rule on it in advance, but I think it's --
22 and I'd obviously have to hear it. I just don't know how one
23 gets there without an expert opinion that it's appropriate.

24 **MR. DOREN:** Thank you, Your Honor.

25 **THE COURT:** Okay.

1 Next? Mr. Bornstein?

2 **MR. BORNSTEIN:** Thank you, Your Honor.

3 I think this might be both easy and -- at least for this
4 morning, and maybe a little bit more challenging later in the
5 week.

6 Mr. Lo and I have conferred, and the parties happily have
7 reached agreement on all of the expert written testimony with
8 the exception of two.

9 **THE COURT:** Okay.

10 **MR. BORNSTEIN:** We each have one objection to the
11 other's, and our suggestion would be that it might be more
12 efficient for Your Honor if we submitted something in writing
13 so that Your Honor could consider it in context, if that would
14 be acceptable.

15 And then it's just a question of how and when Your Honor
16 would like to receive that. The parties can, of course, do it
17 as expeditiously as would be useful subject to whatever page
18 limits would be helpful for Your Honor.

19 **THE COURT:** And this is -- is this in the nature of
20 sealing or striking?

21 **MR. BORNSTEIN:** Not in the nature of sealing. We
22 think there are some sealing issues in which the Court has
23 already ruled, and I believe there is one expert report as to
24 which Apple has some additional sealing requests that had not
25 yet been made to the Court. These are in the nature of

1 striking.

2 And the two reports at issue are Professor Athey's report
3 from Epic and Professor Hitt's report from Apple, as to which
4 each side has made targeted objections. It's not the whole
5 report in either instance.

6 **THE COURT:** Okay.

7 And in short, what are the issues?

8 **MR. BORNSTEIN:** Well, I'll -- I'll take ours and I
9 will let Mr. Lo take his.

10 Our objection with respect to Professor Hitt is that he's
11 changed his opinion in one respect in light of, I presume, the
12 cross-examination. And we believe it's inappropriate for him
13 to actually make a substantive change to his opinion at this
14 point in time without the ability for us to respond to it.

15 **THE COURT:** Did he change his -- so his written
16 direct was done in advance.

17 **MR. BORNSTEIN:** Correct.

18 **THE COURT:** And the cross-examination at trial or the
19 cross-examination during his deposition?

20 **MR. BORNSTEIN:** I'd presume this was done in response
21 to his cross-examination at trial.

22 Our objection is what Apple would like to submit to the
23 Court is an edit to the written direct that was previously
24 submitted and was the basis of the cross-examination. And we
25 think it's inappropriate for them to change his opinion at

1 this point in time.

2 **THE COURT:** Okay.

3 And a response on that?

4 **MR. LO:** Yes, Your Honor. Jason Lo on behalf of
5 Apple.

6 The change that is at issue was something that came up in
7 cross-examination, and as a result of that, Professor Hitt has
8 struck out, I think, literally three words in order to make
9 clear what his analysis was.

10 And to be clear, it is consistent with other portions of
11 his written direct, so it's not a situation where if we didn't
12 make the change the evidence is not there. We are proposing
13 the change simply to make it potentially less confusing, but
14 the analysis is there in another place of the written direct
15 anyway, so we just wanted to avoid confusion.

16 **THE COURT:** Was it addressed during his Redirect?

17 **MR. LO:** Yes. Not directly on point, but, yes, the
18 subject was addressed during the examination.

19 **THE COURT:** So why isn't that sufficient?

20 **MR. LO:** It may be, and we are happy to address that,
21 but, again, our view was it was only for purpose of
22 clarification and to avoid confusion, and the analyses is
23 otherwise in another portion of the written direct.

24 **THE COURT:** Mr. Bornstein, give me a paragraph in his
25 report, and the words.

1 **MR. BORNSTEIN:** It's paragraph -- from the testimony,
2 Your Honor, it's paragraph 51.

3 **THE COURT:** Okay. Hold on.

4 Which are the words?

5 **MR. BORNSTEIN:** The words that were stricken, Your
6 Honor, were in the last sentence where it's been changed
7 from -- I'm starting from the second-to-last line. It has
8 been changed from, "a full one-third offered direct purchases
9 of content through a web browser on the iOS device." And
10 that's been changed to: "An almost one-third offered direct
11 purchases of content through a web browser." And then he has
12 stricken "on the iOS device."

13 We don't have an objection to the change of full one-third
14 to almost one-third, that's fine. But striking "on the iOS
15 device," we believe, changes the meaning here.

16 His opinion was that these purchases are available on the
17 web browser on an iPhone. And he's now, in light of the
18 cross-examination that showed that not to be correct, he's
19 changed it to, purchases of content through a web browser more
20 generally, which would capture other devices. And had that
21 been his opinion at trial, we would have cross-examined more
22 thoroughly on that broader opinion.

23 **THE COURT:** The request to delete those words is
24 denied.

25 Next issue.

1 **MR. LO:** With respect to Professor Athey, Your Honor,
2 this was a question that was raised during examination.

3 Professor Athey gave certain opinions about what consumers
4 think or what consumers do. At the time of the objection, the
5 Court said you would consider whether there are factual
6 support for those types of statements essentially after the
7 facts have come in.

8 And now that Epic is either close or will be closing their
9 factual case, we are renewing that objection on the basis that
10 there have been no testimony on those underlying factors.

11 **THE COURT:** Okay. That probably requires more. So
12 what I would need, I think, to resolve that is the factual
13 basis for Epic's position. I don't know that I need a lot of
14 argument. What I need to know is where the factual basis
15 comes from.

16 **MR. BORNSTEIN:** Understood, Your Honor.

17 We would have, in our written submission, two other points
18 to make that I'll just foreshadow. One being the parties
19 reached a stipulation under which Apple agreed not to make the
20 argument that they are making right now. And the other being
21 that we believe that the opinions that are at issue in Apple's
22 objection here are proper under Rule 703 even as to facts that
23 are not admissible or admitted, but nevertheless within the
24 scope of facts on which an expert is permitted to rely under
25 the rule.

1 **THE COURT:** Okay. It doesn't sound like I need more
2 than four pages of briefing. And then I'll take a look at
3 what the factual basis is. And perhaps it also just means
4 that, as I will do with many of these things is, I need to
5 decide how much weight to give any opinion. And it could be
6 little to a lot.

7 So, okay. Just when you get it filed, I'll try to turn it
8 around.

9 **MR. BORNSTEIN:** Would Your Honor like those
10 simultaneously? If so, we can coordinate on a time.

11 **THE COURT:** That would be preferable. Thanks.

12 **MR. BORNSTEIN:** Thank you, Your Honor.

13 **MR. LO:** Thank you, Your Honor.

14 **THE COURT:** Okay. That's it from your side,
15 Ms. Forrest?

16 **MS. FORREST:** Yes, Your Honor.

17 **THE COURT:** Mr. Doren, how about from your side?

18 **MR. DOREN:** That is it from our side, Your Honor.

19 **THE COURT:** Okay. Then let's call Professor Mickens
20 back to the stand.

21 Good morning, Professor.

22 **THE WITNESS:** Good morning.

23 **THE COURT:** Our weather this weekend was not as warm
24 as it was the prior weekend, so -- but maybe that reminds you
25 of Massachusetts.

1 You're still under oath.

2 **THE WITNESS:** Yes.

3 **MR. LO:** Your Honor, may I hand up a binder for the
4 witness?

5 **THE COURT:** You may. So I take it that you pass the
6 witness?

7 **MR. CLARKE:** Yes, Your Honor. We pass the witness.

8 **THE COURT:** All right. Mr. Lo, you may hand it up
9 and you may proceed.

10 **MR. LO:** Thank you, Your Honor.

11 **CROSS-EXAMINATION**

12 **BY MR. LO:**

13 **Q.** Good morning, Professor Mickens.

14 **A.** Good morning.

15 **Q.** Can you hear me okay?

16 **A.** Yes. Can you hear me?

17 **Q.** Yes, I can. Thank you.

18 **THE COURT:** Although is he --

19 **THE CLERK:** I'm going to turn on his mic.

20 **THE WITNESS:** Hello? Good?

21 **THE COURT:** No, not quite.

22 **THE WITNESS:** No? Not quite?

23 How about now? Testing.

24 **THE CLERK:** You have the mic underneath?

25 **THE WITNESS:** How about now?

1 **THE COURT:** I think that that's better. You're not
2 holding that mic, are you?

3 **THE WITNESS:** No.

4 **THE COURT:** I think that works.

5 **THE WITNESS:** Okay.

6 **THE COURT:** You may proceed.

7 **MR. LO:** Thank you, Your Honor.

8 **BY MR. LO:**

9 **Q.** Professor Mickens, my name is Jason Lo, and I represent
10 Apple.

11 **A.** Hello.

12 **Q.** On Friday, the judge asked you whether you have an opinion
13 as to why the Android has more security issues than the
14 iPhone.

15 Do you recall that question from the judge?

16 **A.** Yes.

17 **Q.** And you disagree with the premise that Android has more
18 security issues than the iPhone; is that correct?

19 **A.** Yes.

20 **Q.** And, in fact, you testified under oath that Android and
21 iOS are in the same rough equivalence class when it comes to
22 susceptibility to malware, viruses or, things like that.

23 Do you recall that exchange, sir?

24 **A.** I do.

25 **Q.** In fact, sir, you personally don't know whether or not

1 iOS has historically had more, or less, or the same amount of
2 the malware as distributed by the store on Android, do you,
3 sir?

4 **A.** I don't know that anybody knows that.

5 **Q.** Do you personally know, sir?

6 **A.** I personally do not.

7 **Q.** And, in fact, you claim not to be able to get your hands
8 on numbers that you would trust about the relative frequency
9 of malware on each device, correct?

10 **A.** Yes. I think that methodologically it's very difficult to
11 get those numbers.

12 **Q.** Let's start by talking about the work that you did in this
13 case.

14 You did not sign the protective order, correct?

15 **A.** That is correct.

16 **Q.** You formed your opinions in this case without taking into
17 account a single internal document produced by Apple, correct?

18 **A.** That is right.

19 **Q.** And that includes Apple internal documentation about
20 security issues and app review, correct?

21 **A.** Yes.

22 **Q.** When you formed your opinions, you had not reviewed the
23 testimony of the -- any of the current or former Apple
24 employees who have been deposed in this case, correct?

25 **A.** If I understand the question correctly, at the time that I

1 prepared by expert witness report, no, that was before any of
2 the trial testimony of the Apple employees.

3 Q. Okay.

4 At that time, were you aware that certain Apple employees
5 had already been deposed in the case?

6 A. I don't believe that I was aware of that.

7 Q. But in any event, at the time you signed your expert
8 report, you had not read the deposition transcript of any
9 current or former Apple employees in connection with this
10 case, correct?

11 A. I believe that's right.

12 Q. You mentioned on Friday, though, that you reviewed
13 materials on reverse engineering.

14 Did I catch that correctly?

15 A. Yes. If I understand the question, as I was preparing my
16 expert report, I looked at reverse engineering materials.

17 Q. None of the materials relating to reverse engineering
18 relate to the tools that Apple uses for app review, correct?

19 A. That's correct, although not relevant to my determination.

20 Q. And in your expert report, you do not discuss a single
21 book, article, or source of any kind that gave you factual
22 information about the tools that Apple uses to conduct app
23 review, correct?

24 A. That is correct.

25 Q. And prior to signing your report, you did not see any

1 factual information about the human process that Apple employs
2 to conduct app review, correct?

3 **A.** I saw no internal Apple documentation about that, although
4 I saw Apple's public-facing documentation such as the review
5 guidelines and I also looked at public-facing evidence about
6 the efficacy of that procedure.

7 **Q.** Right.

8 What you did, was you looked at Apple's publicly available
9 review guidelines, and then you went ahead and made
10 assumptions about what Apple must be doing behind the scenes
11 in order to enforce those guidelines, correct?

12 **A.** No. Not just that. So I also looked at quote-unquote
13 "the lived experience," if you will, developers, for example,
14 who have experienced app rejections. I looked at other
15 complaints or such things involving the app review process.

16 **Q.** Okay. We will talk about that in a minute.

17 **A.** Okay.

18 **Q.** So you chose to form your opinions in this case without
19 knowing all of the mechanisms by which Apple's app review is
20 conducted, correct?

21 **A.** That's correct, although there's --

22 **Q.** Thank you.

23 **A.** -- abundance of empirical evidence --

24 **Q.** Thank you --

25 (Simultaneous colloquy.)

1 Q. Thank you, professor.

2 A. Yes.

3 Q. Now, to support your opinions, I think you just referenced
4 this a minute ago, you cite to media articles about
5 problematic apps that apparently got through the app-review
6 process, correct?

7 A. Yes, sir.

8 Q. I think there's one article that talks about a 2019
9 scenario in which Apple had to take down 17 apps.

10 Do you recall that article?

11 A. Yes.

12 Q. And then there's another article that you cite talking
13 about two fitness apps that Apple took down I think in the
14 2018 time frame.

15 Does that sound familiar?

16 A. That sounds about right, yes.

17 Q. You did not personally examine the 17 apps that were taken
18 down, did you?

19 A. No.

20 Q. You didn't personally examine the two fitness apps that
21 were taken down and referenced in those articles, correct?

22 A. Correct, although the sources cited are considered
23 reputable in my field.

24 Q. In fact, for all of the allegedly bad apps that you
25 reference in your expert report, is it accurate to say that

1 you did not personally examine any of them?

2 **A.** Yes. In the same way that Apple hasn't looked at some of
3 the results from the Nokia report I imagine. They rely on
4 outside sources.

5 **Q.** Sir, so you did not personally examine any of the
6 allegedly bad apps that you reference in the article, correct?

7 **A.** That's correct.

8 **Q.** And while your quick to criticize Apple regarding these
9 apps, is it fair to say that you rendered that criticism in
10 your report without taking into account the total number of
11 apps that goes through the app-review process every year?

12 That's not data that you took into consideration, correct?

13 **A.** That data wasn't relevant to my determination.

14 **Q.** So you did not take it into consideration, correct?

15 **A.** Correct. Because I didn't think it was relevant.

16 **Q.** And you also did not take into account the number of
17 similar apps, similar to the bad apps that you point out, that
18 Apple successfully kept from reaching iOS device users; you
19 didn't take that data into account, correct?

20 **A.** If by that data I believe you are referring to like
21 internal Apple statistics about that, I did not review any
22 internal Apple statistics.

23 **Q.** What I mean is, when you point out that certain bad apps
24 got through the app-review process, you did not take into
25 account whether there are similar bad apps that Apple

1 successfully prevented from getting through the app-review
2 system and kept away from the public; that's not information
3 you considered in rendering your opinions, correct?

4 **A.** No because I don't believe that information is relevant to
5 my overall determination.

6 **Q.** Okay.

7 And let's take a look --

8 **MR. LO:** I will ask Mr. Eltiste to put up the slides
9 you discussed on Friday.

10 **BY MR. LO:**

11 **Q.** And let's take a look at PDX81.12.

12 Now, you recognize this as one of the demonstratives that
13 you used on Friday?

14 **A.** I do.

15 **Q.** And at the very bottom there's a section on legal
16 compliance.

17 Do you see that?

18 **A.** I do.

19 **Q.** And your conclusion on Friday was that it is difficult for
20 app review to ascertain whether an app is in legal compliance,
21 correct?

22 **A.** Correct.

23 **Q.** When you formed your opinions, you had no factual
24 information about what tools Apple uses to ensure that apps
25 don't have a legal compliance issue, correct?

1 **A.** Not entirely. My determination about this was based on
2 general purpose computer science knowledge about what I
3 believed --

4 **Q.** Sir, my question is about, do you know what tools the
5 app-review process uses to ensure that apps don't have legal
6 compliance issues?

7 Did you have any factual information about that at the
8 time you signed your opinions?

9 **A.** None other than the general purpose computer science
10 knowledge that I mentioned.

11 **Q.** When you formed your opinions, you had no factual
12 information about how Apple's app reviewers are trained or not
13 trained, perhaps, to look for legal compliance issues; that's
14 also not something you took into account prior to signing your
15 report, correct?

16 **A.** Not entirely. Because I'm able to look at the empirical
17 effectiveness and empirical characteristics --

18 **Q.** Sir, my question is, do you have or did you have
19 information about how Apple trains its app reviewers to look
20 for legal compliance issues?

21 **A.** I could only see the effects of that. But, no, I didn't
22 see the internal training documents, for example.

23 **Q.** You don't know anything about what internal training Apple
24 provides to its reviewers in order to ensure that apps don't
25 have legal compliance issue.

1 Do we agree on that?

2 **A.** Partially. I think that some of that training can be
3 gleaned from the review guidelines, for example.

4 **Q.** And when you formed your opinions, you had no factual
5 information about app reviews success rate in order -- in
6 terms of screening apps for legal compliance issues, correct?

7 **A.** I would not fully agree, no. Because, once again, we can
8 look at the empirical results of that review process and make
9 observations.

10 **Q.** Did you have any data in terms of the actual number of
11 successful or unsuccessful attempts by app review to ensure
12 that apps don't have legal compliance issues?

13 Is that data that you had, sir?

14 **A.** Are you referring to data like the raw number of apps that
15 were scanned for legal issues?

16 **Q.** Correct. The totals.

17 **A.** No, I did not have access to that information.

18 **Q.** In your written direct, you also cite an article -- well,
19 first, even though you didn't have any of that internal data,
20 you were comfortable rendering an opinion that Apple has a
21 difficult time ensuring that apps comply with legal compliance
22 issues, correct?

23 You were comfortable rendering that opinion?

24 **A.** Yes.

25 **Q.** In your written direct, you also cite an article that

1 claimed to have found that iPhone apps suffered from the same
2 security problems found in many Android apps.

3 Do you recall referencing an article to that effect?

4 **A.** I do.

5 **Q.** Would you agree that article only tells you about the
6 types of issues that show up on an iOS and Android, not the
7 total number of instances?

8 Would you agree with that?

9 **A.** I would agree, yes, that it doesn't tell you the
10 denominator.

11 **Q.** Well, it doesn't tell you the numerator either, does it?

12 **A.** Well, it gives you an intuition for the rough equivalence
13 class argument that I make at several points throughout my
14 expert witness report.

15 **Q.** Well, sir, the article that you cite suggested, and I'll
16 generalize that --

17 **THE COURT:** Can you tell me, Mr. Lo, what paragraph
18 of his report we're dealing with so I can go back and review
19 the --

20 **MR. LO:** Yes, Your Honor.

21 May I hand up some binders with the report for the witness
22 so he's got it as well?

23 **THE COURT:** Yes.

24 **MR. LO:** Thank you.

25 **THE WITNESS:** Thank you.

1 **MR. LO:** Your Honor and Professor Mickens, the
2 report -- I'm sorry, the -- it's actually in the written
3 direct, which is in Tab 1. And it is -- I'll ask Mr. Eltiste
4 to pull it up as well so we are looking at it together.

5 It is paragraph 78.

6 **THE COURT:** Thank you.

7 **BY MR. LO:**

8 **Q.** Are you looking at paragraph 78, Professor Mickens?

9 **A.** Yes, sir.

10 **Q.** And that -- this is -- you recall that this is the article
11 that you and I have been discussing for the last two minutes?

12 **A.** That's correct.

13 **Q.** What the article talks about is that on some iPhones --
14 on iPhones, the writer found that there were certain apps
15 that stored things without proper -- stored passwords without
16 properly encrypting them, correct?

17 **A.** Yes. There were also problems of network transmissions of
18 clear text instant data. That's right.

19 **Q.** And the finding by the author was, I found certain apps
20 on iOS that had these problems, and I also found certain
21 apps on Android that had these problems, correct?

22 **A.** Yes.

23 **Q.** And what the author does not say is, that I looked at the
24 total number of apps that were available on iOS and the
25 total number of apps that are on Android, and I found more of

1 them on one platform versus the other.

2 Do you agree that the author did not conduct that
3 analysis?

4 **A.** For reasons of scalability, yes, that's why the author
5 didn't do that.

6 **Q.** Okay.

7 Would you agree that nothing in your written direct
8 conducts -- purports to have conducted an analysis in terms of
9 the total number of incidences on one platform versus the
10 other?

11 **A.** That type of analysis wasn't necessary to make the broad
12 equivalence class argument that I --

13 **Q.** You do agree that that is not in your analysis, correct?

14 **A.** Yes. I'm just establishing that it isn't necessary to
15 create my conclusions.

16 **Q.** Thank you.

17 **MR. LO:** You can take that down, Mr. Eltiste. Thank
18 you.

19 **BY MR. LO:**

20 **Q.** On Friday you mentioned on direct examination that you
21 reviewed certain books by Jonathan Levin?

22 **A.** Yes, sir.

23 **Q.** And I'll ask Mr. Eltiste to put up your report which is at
24 Tab 2. And if you go to page 63, that's got your materials
25 relied upon, just make sure we are on the same page here.

1 And this is -- do you recognize, sir, that this is the
2 appendix A to your expert report?

3 **A.** I believe that it is, yes.

4 **Q.** And this is the area where you listed the materialities
5 that you relied upon in rendering your opinions, correct?

6 **A.** Yes.

7 **Q.** And in the book section, it looks like you didn't
8 reference one book by Mr. Levin, you referenced three of them,
9 correct?

10 **A.** Yes, that's right.

11 **Q.** Is there a reason why you relied on three separate books
12 by Mr. Levin?

13 **A.** So, let's see. The first -- sorry. The third book, I
14 believe, is an older book that Levin wrote.

15 And then the -- there's a newer version of that, which is
16 the 2017 one. I'm not sure if the 2016 version, if that's --
17 like an error in -- I don't know if there is a separate book.

18 I only recall looking at two individual books written by
19 that author.

20 **Q.** Do you recall which two you looked at?

21 **A.** The most recent version of the macOS and iOS internals
22 book and then the original book, the 2013.

23 **Q.** The 2013 and the 2017?

24 **A.** Yes.

25 **Q.** On Friday you gave testimony about notarization and

1 gatekeeper mechanisms on MacOS.

2 Do you recall that?

3 **A.** Yes, sir.

4 **Q.** Is it your understanding that that technology came into
5 place in around the 2019 time frame?

6 **A.** That is about right, yes.

7 **Q.** So that technology came in after the publication dates of
8 all of Mr. Levin's books, correct?

9 **A.** I believe that's correct. Yes.

10 **Q.** Let's take a look, actually, at Mr. Levin's book. And you
11 will have a copy of it in Tab 12 of your blinder.

12 **MR. LO:** I will ask Mr. Eltiste to put it up.

13 **BY MR. LO:**

14 **Q.** By the way, is Mr. Levin a respected authority in the --
15 in your field?

16 **A.** He is.

17 **Q.** And you recognize the -- this cover page here as
18 Mr. Levin's book? I believe this is the original one.

19 **A.** This is the 2013 book.

20 **Q.** Turn to what's page 80 of this book, sir.

21 **A.** Yes, sir.

22 **Q.** I'm going to read from the paragraph at the very top that
23 says "in actuality."

24 **A.** Uh-huh.

25 **Q.** (reading)

1 "In actuality, however, Apple's application security
2 is light years, if not parsecs ahead of its peers.
3 Windows user account control, UAC, has been long
4 present in OS X. IOSs hardening makes Android seem
5 riddled in comparison."

6 Do you see that, sir?

7 **A.** I do.

8 **Q.** And for those of us who are not Star Wars fans, the word
9 "parsecs" that's Mr. Levin's way of saying that Apple is far,
10 far ahead of its competitors in terms of security?

11 **A.** That's right.

12 I should note, though, this is a 2013 quote. That's
13 actually quite relevant to my testimony --

14 **Q.** Thank you.

15 **A.** -- and to my written direct report.

16 **Q.** Thank you.

17 Let's move forward in time then. In 2018, you are aware
18 that Epic offered a *Fortnite* installer for Android, users?

19 **A.** I am aware of that, yes.

20 **Q.** And that was Epic's way of trying to make *Fortnite*
21 available for Android users without having to go through the
22 Google Play store, correct?

23 **A.** I believe that's correct, yes.

24 **Q.** And you are aware that immediately after that installer
25 was released, it was discovered that the *Fortnite* installer

1 had a security vulnerability?

2 **A.** That's correct.

3 **Q.** And that was a serious security vulnerability, correct?

4 **A.** Yes, one that was fixed very quickly.

5 **Q.** And would you agree that that was a fairly common
6 vulnerability in Android?

7 **A.** The security error in question was not an Android error so
8 much as it was a programming bug in the *Fortnite* installer
9 itself.

10 **Q.** Okay.

11 So would you agree that that vulnerability was caused more
12 by carelessness on Epic's part rather than a vulnerability in
13 the Android system?

14 **A.** I would have to think about that. It was a programming
15 error. I'm not quite sure how to apportion blame between the
16 two parties.

17 **Q.** Now, when I asked you about that error, you were quick to
18 point out that Epic fixed it quickly. Yes?

19 **A.** Yes.

20 **Q.** And you were quick to point that out because you wanted to
21 put in the context of the security vulnerability in terms of
22 how quickly Epic patched up the vulnerability; is that why you
23 offered that, you volunteered that information?

24 **A.** Not quite. I offered up that information because I think
25 that it's hard to deploy a complex piece of software.

1 We see that with Apple. Apple has been subjected to jail
2 breaking attacks for the past what, 10, 15 years. It's hard.
3 And all that means is that it's difficult to create complex
4 software.

5 **Q.** In your analysis of Apple's shortcomings with respect to
6 its security issues, would you agree that there is no place in
7 your report where you took into account the speed with which
8 Apple remedied any of the issues?

9 That's not part of your analysis, correct?

10 **A.** Because it's not relevant to my determination of the right
11 equivalence class argument.

12 **Q.** When I asked you about Epic's security shortcomings, you
13 volunteered information about the speed of the patch, correct?

14 **A.** That's correct.

15 **Q.** And -- but when it comes to the Apple potential
16 shortcomings, that was not relevant to your analysis, correct,
17 the speed with which Apple may or may not have remedied any
18 security issues, correct?

19 **A.** No. Because all that I am trying to establish in my
20 expert witness report is this rough parity argument.

21 **Q.** Sir, did you or did you not take into account the manner
22 in which Apple remedied any of the security shortcomings you
23 allege occurred?

24 Is that something you took into account?

25 **A.** I did. In making --

1 Q. Okay.

2 (Simultaneous colloquy.)

3 Q. Let's go to your report in -- which is in Tab 2.

4 A. Yes, sir.

5 Q. And would you point me to the paragraph where you took
6 into account the speed or the manner in which Apple responded
7 to any of the vulnerabilities or shortcomings you point out?

8 What paragraph should we look at?

9 A. Well, I don't have the report memorized. So I do know,
10 though, there is a discussion in that report -- I mean, I can
11 take the time to look for the particular paragraph number if
12 you'd like.

13 Q. We will see if it comes up on redirect, and we will move
14 on. Thank you.

15 A. I do establish in the report --

16 Q. Thank you. There is no question pending.

17 A. Yes, sir.

18 Q. You have heard of "security" referred to as a cat and
19 mouse game?

20 A. That's right.

21 Q. And it's a weird analogy, but I guess it means that
22 sometimes the cat wins and sometimes the mouse wins?

23 A. Accurate.

24 Q. And the analogy is there because in security, the
25 attackers are constantly trying to up their game to one-up the

1 cat. I'm going to say that the defender is the cat in this
2 situation.

3 **A.** Sure.

4 **Q.** And as a result, the cat has to constantly up its game in
5 order to keep up with the attackers, the mouse, correct?

6 **A.** That's right.

7 **Q.** All right.

8 What you did, sir, in your report, was you took snapshots
9 in moment in which the cat got a temporary advantage. That's
10 what you did, sir, correct? You pointed out situations in
11 which bad apps got through the app-review process, correct?

12 **THE COURT:** You mean the mouse?

13 **MR. LO:** The mouse. Thank you, Your Honor. This is
14 the danger of analogies. Yes.

15 **THE WITNESS:** There's a lot going on, but suffice it
16 to say that the report does point out some specific instances
17 where -- let's just say the attacker won.

18 **BY MR. LO:**

19 **Q.** Yeah. And what you don't take into account is how the
20 cat -- I'll get it right this time -- responded to any of
21 those circumstances; that was not relevant to your analysis,
22 correct?

23 **A.** I disagree. Because the report actually talks about
24 specifically many of the defensive techniques that iOS in
25 particular uses.

1 Q. Do you -- do you talk about any of the responses that
2 Apple took in terms of its app-review process in order to make
3 it stronger relative to attackers; is that something you
4 discussed?

5 A. Well, it gets back to the question from a few minutes ago.

6 I talk about in the report that major software companies,
7 like Apple, have a strong security culture, and that speaks
8 directly to your question.

9 Q. Sir, my question is focused on the app-review process.

10 Do you or do you not discuss how Apple's app-review
11 process may have responded to any of the incidences you raise
12 in your report? Is that anywhere in there?

13 A. I think this section about security culture speaks to that
14 indirectly, yes.

15 THE COURT: You said indirectly?

16 THE WITNESS: Indirectly, yes.

17 THE COURT: You said that's in the report, but it's
18 not in the direct examine, your direct written testimony?

19 THE WITNESS: I would have to look and see.

20 THE COURT: That's okay if you don't know.

21 THE WITNESS: Okay.

22 BY MR. LO:

23 Q. Let's change subjects for a minute and talk about zero-day
24 vulnerabilities.

25 As I understand it from reading your written direct, a

1 zero-day vulnerability is a security bug that is unknown to
2 the developers of the Bug E program, correct?

3 **A.** That is correct.

4 **Q.** So in the context of a mobile device, it could be a flaw
5 in the operating system or in the browser or maybe even the
6 hardware, correct? It could be in any of those places,
7 correct?

8 **A.** Yes.

9 **Q.** And it's called a zero-day vulnerability because it's
10 something that the manufacturer, which in this case, let's say
11 it's Apple, doesn't even know about, correct?

12 **A.** Yes.

13 **Q.** And it's got value to an attacker because if you use a
14 vulnerability that Apple doesn't even know about, then Apple
15 is not defending against it at the moment, correct?

16 **A.** Correct.

17 **Q.** And apparently there's a market to buy these
18 vulnerabilities, correct?

19 **A.** Yes, sir.

20 **Q.** That is because people or law enforcement or nation states
21 will buy knowledge about these vulnerabilities in order to
22 gain access to a device, correct?

23 **A.** That's right.

24 **Q.** And in your written direct, you cite to evidence that on
25 at least one marketplace, it costs more money to buy a

1 vulnerability for Android devices than it is to buy a
2 vulnerability for iOS devices.

3 Do you recall that, sir?

4 **A.** I do.

5 **Q.** And I think the market analysis or logic is that the more
6 secure a device is, the more one has to pay to find a
7 vulnerability to break into it.

8 Is that roughly correct?

9 **A.** Yes.

10 **Q.** So if you -- one wanted to find a way to break into Fort
11 Knox, that's going to cost a little bit more than finding a
12 way to break into the local bank, yes?

13 **A.** Yes.

14 **Q.** All right.

15 Let's take a look at the data that you actually relied
16 upon. And that's in Tab 10 of your binder.

17 **MR. LO:** I will ask Mr. Eltiste to put it up on the
18 screen as well.

19 **BY MR. LO:**

20 **Q.** And particularly, it's on, I believe, you looked at page 6
21 of this document.

22 Do you recognize this as the payout table that you were
23 looking at for the zero-day vulnerability payouts?

24 **A.** I do.

25 **Q.** And this is from the website of Zerodium and you cite to

1 this particular page in your -- both in your report and
2 written direct, correct?

3 **A.** Correct.

4 **Q.** First, let's get oriented here and make sure we are
5 looking at the same information.

6 If you go to the top right-hand corner, you will see -- is
7 that a brown? What would you call that color?

8 **A.** It's brownish. That's close enough.

9 **Q.** All right. Let's say it's brownish. And that's for an
10 Android FCP 0-click. So that's a particular type of
11 vulnerability, that if you can come up with one, Zerodium
12 would pay you for it, correct?

13 **A.** Yes.

14 **Q.** All right.

15 And we can see in the middle of this page there's a
16 legend, which the brownish color is for Android. Yes?

17 **A.** Yes.

18 **Q.** And then to read this table, if we go all the way to the
19 left, we'll see that the highest price for an Android
20 vulnerability is \$2.5 million, correct?

21 **A.** That's correct.

22 **Q.** Now, if we come back to the right-hand side, we see that
23 the next highest box is a red box and that's for an iOS
24 vulnerability, correct?

25 **A.** Correct.

1 Q. And if we just again skip over to the left-hand side of
2 this periodic table-looking document, you see that the highest
3 price that zero-day was willing to pay at the time was
4 \$2 million for an iOS zero-day vulnerability, correct?

5 A. Correct.

6 Q. You are using the difference between the \$2 million payout
7 and the \$2.5 million payout for Android as a way of
8 demonstrating that Android is more secure than iOS; that was
9 the logic you used?

10 A. Not quite.

11 Q. Well, let me see if I can reframe that then.

12 A. Please.

13 Q. You stated in your testimony that a reasonable
14 interpretation of this market data is that iOS phones are
15 now easier to compromise than Android phones making iOS
16 exploits less valuable.

17 Would you agree with that?

18 A. I said that, yes, that's a reasonable interpretation of
19 the data. I also said that --

20 Q. Thank you.

21 A. -- market data.

22 Q. The gap between 2 million and \$2.5 million for a zero-day
23 vulnerability, would you consider that to be a significant
24 gap?

25 A. Well, remember that my argument is about equivalence

1 classes. I think that if we are trying to argue about
2 equivalence classes, then that gap is sufficient to suggest
3 that both iOS and Android are at least in the same rough
4 equivalence class with respect to security.

5 **MR. LO:** You can take that down, Mr. Eltiste. Thank
6 you.

7 **BY MR. LO:**

8 **Q.** Let's switch topics and talk about macOS.

9 **A.** Okay.

10 **Q.** You have observed that macOS allows for sideloading,
11 meaning the distribution of applications outside of the Mac
12 App Store, correct?

13 **A.** Correct.

14 **Q.** And the inference you draw from that is that if
15 sideloading is safe enough for macOS, then it ought to be
16 safe enough for iOS, correct?

17 **A.** That's paraphrasing a bit, but roughly, yes.

18 **Q.** You did not analyze in your testimony whether different
19 security considerations apply for computers as opposed to
20 mobile devices, correct?

21 **A.** I don't believe that claim to be true.

22 **Q.** Did you analyze whether the difference in numbers of iOS
23 devices versus macOS devices create different security
24 considerations?

25 Do you believe that claim to be true?

1 **A.** I do not.

2 **Q.** Do you believe that malware developers will tend to target
3 their attacks on the devices with the most number of users?

4 **A.** Not necessarily.

5 **Q.** Okay.

6 So you don't agree that as if -- for a typical malware
7 developer, they may say there's a lot more Windows computers
8 out there as opposed to Mac computers, so I am going to put my
9 effort into writing malware for Windows computers because that
10 allows me to reach the greatest audience of potential victims.

11 You don't agree with that?

12 **A.** I believe that's part of the calculation that malware
13 writers use, but that's not the end story.

14 **Q.** Okay.

15 Well, let's take a look at what Mr. Levin has to say about
16 that. So let's go back to Tab 12. And this is, again, the
17 Jonathan Levin book that you cited to three times or three
18 different times in your expert report.

19 And turn to page 79.

20 **MR. LO:** And I'll ask Mr. Eltiste to put it up so we
21 can look at it together.

22 And it's the bottom heading OS X and iOS security
23 mechanisms. Let me know when you're there.

24 **THE WITNESS:** This is Tab 12?

25 **THE COURT:** Yes. Tab 12 of your binder with your

1 cross-examination exhibits.

2 **THE WITNESS:** All right.

3 **BY MR. LO:**

4 **Q.** Let's see what Mr. Levin writes. He writes that, "viruses
5 and malware are rare on OS X."

6 Let me pause there. You recognize OS X as a reference to
7 the then current version of MacOS?

8 **A.** Correct.

9 **Q.** It was version 10, correct?

10 **A.** Correct.

11 **Q.** (reading)

12 "Which is something Apple has kept boasting for many
13 years as an advantage for Mac in their commercials of
14 Mac versus PC. This, however, is largely due to the
15 Windows monoculture. Put yourself in the role of
16 malware developer, concocting your scheme for the
17 next devious bot. Would you invest your time and
18 effort in attacking 90 percent of the world or under
19 5 percent"?

20 And then it goes:

21 "On, indeed, OS X and to an extent Linux, remain
22 healthy in part simply because they do not attract
23 much attention from malware providers, another reason
24 is that UN*X has always adhered to the principle of
25 least privilege in this case of not allowing the user

1 root access by default."

2 Did you understand Mr. Levin's point here to be that
3 because there were fewer Mac devices at the time of this
4 writing, there were simply fewer attackers interested in
5 attacking Mac computers?

6 Did you understand that to be what he was presenting here?

7 **A.** Yes, I believe that's his argument.

8 **Q.** And you understood his analysis to be that malware
9 developers will target the products with the greatest number
10 of devices, correct?

11 **A.** That's the argument that he's making here, although I
12 don't fully agree with that analysis.

13 **Q.** Sure.

14 And in rendering your analysis here, you ignored the
15 possibility that today MacOS can stand to have different
16 security measures from iOS simply from the fact that there
17 are fewer macOS devices out there; that's not something you
18 took into consideration, correct?

19 **A.** From the security perspective, that's a difference without
20 distinction.

21 **Q.** Okay.

22 And from a security perspective, is it a difference
23 without distinction that because there are much fewer Macs out
24 there than iOS devices, it may just be the case that there
25 are fewer attempted attacks on Macs as opposed to iOS? Is

1 that a distinction without a difference in your view as well?

2 **A.** Well, I think Apple certainly doesn't think that way
3 because it doesn't advertise macOS as being less secure
4 because hey, there are fewer attacks on macOS.

5 **Q.** Okay. But it's not relevant to your consideration,
6 correct, the number of devices?

7 **A.** The number of devices that are used in the world hopefully
8 doesn't make a determination on whether we try to make those
9 devices secure.

10 **Q.** Does the number of devices that are out there in the world
11 have any impact, in your view, on the incentives for attackers
12 to write malware for a particular platform?

13 **A.** I think there are two things --

14 **Q.** Does it or does it not in your view?

15 **A.** It is part of the determination --

16 **Q.** Okay.

17 **A.** -- that guides what malware writers do.

18 **MR. LO:** Your Honor, we have a copy of this document
19 which we would like to enter into evidence as 5562.

20 I can hand that up if Your Honor permits.

21 **THE COURT:** Of the next one you mean?

22 **MR. LO:** Of this particular document, we have it
23 marked as the next number, which would be 5562, and we move to
24 enter it into evidence.

25 **THE COURT:** Mr. Levin's document?

1 **MR. LO:** Yes, Your Honor.

2 **MR. CLARKE:** Objection, Your Honor. I'm not sure
3 what the non-hearsay purpose of this document would be in
4 evidence.

5 **THE COURT:** Okay. Response?

6 **MR. LO:** Well, first, it's -- if Mr. Clarke is saying
7 it is not admissible for the truth of the matter, it is a
8 document that Mr. Mickens relies upon. And, second, I think
9 the words that are written by Mr. Levin in the community has
10 independent value regardless of whether it is for the truth of
11 the matter or not.

12 **THE COURT:** I'll admit it for the limited purpose of
13 understanding what Mr. -- or Professor Mickens relied on it
14 for in his report.

15 **MR. LO:** Thank you, Your Honor. May I hand the
16 exhibits up?

17 **THE COURT:** You can hand one to the clerk. I have my
18 own copy.

19 **MR. LO:** Thank you.

20 (Defendant's Exhibit 5562 received in evidence)

21 **THE COURT:** I take it that -- I'll just say this: I
22 thought that each side -- each of their witnesses experts was
23 relying on significant amounts of hearsay. And I think
24 Mr. Evans told me that that's what antitrust economists do.
25 So this really isn't anything different from those. Proceed.

1 **MR. LO:** Thank you, Your Honor.

2 **BY MR. LO:**

3 **Q.** Let's keep talking about MacOS. You were asked on
4 Friday whether iOS is more secure than MacOS.

5 Do you remember the judge asking you that question?

6 **A.** Yes.

7 **Q.** And your answer was, and I think it's consistent with what
8 you are saying this morning is that, I would not say it is
9 meaningfully more secure.

10 Do you recall that exchange?

11 **A.** I do.

12 **Q.** Did you observe any data that sheds light on whether MacOS
13 with its ability to sideload is, in fact, meaningfully -- in
14 fact equally secure as iOS?

15 Did you see any data that would shed light on this
16 particular issue?

17 **A.** The data that I considered was the design of the two
18 operating systems in the security mechanisms they use.

19 **Q.** Any other data that you had in mind?

20 **A.** If I understand the intent of the question, no. The
21 majority of evidence that I looked at was the engineering and
22 security of the two systems.

23 **Q.** Let's go back to tab 10, which is the Zeriodium document.
24 And let's go back to page 6.

25 **A.** Yes.

1 Q. All right.

2 We were just talking about this a few minutes ago. And
3 you pointed out that Android has a higher payout than iOS.
4 And as we talked about, a reasonable interpretation of that
5 data is that iOS phones are now easier to compromise than
6 Android phones.

7 Do you recall discussing that a few minutes ago?

8 A. I do.

9 Q. Let's turn back one page, so let's go to page 5 of the
10 document. And here, we've got another periodic table-looking
11 chart except this one is for desktops and servers.

12 Do you see that, sir?

13 A. I do.

14 Q. And let's start with the legend in the middle.

15 And you'll see that -- can we agree to call it orange for
16 MacOS; is that close enough?

17 A. Sure.

18 Q. All right.

19 So the legend says that you look for the orange box to see
20 what the payouts are for MacOS, correct?

21 A. Correct.

22 Q. Now let's look for the highest paying MacOS zero-day
23 payout.

24 Would you agree that that's in the left-hand side, middle
25 of the page that says "Safari RCE LPE"?

1 **A.** Yes.

2 **Q.** And according to the zero-day Zerodium zero-day chart, the
3 highest payout of MacOS at the same, again it's the same
4 document we were looking at earlier, is up to 100,000,
5 correct?

6 **A.** That's correct.

7 **Q.** And if my math is correct, that would mean that the
8 highest payout that zerodium is giving for a MacOS
9 vulnerability is 5 percent of the highest payout for iOS,
10 correct?

11 **A.** Uh --

12 **Q.** Maybe I'll make it easier.

13 **MR. LO:** Mr. Eltiste, is there a way to put page 6
14 and page 5 side by side so we don't have to flip back and
15 forth?

16 There we go.

17 **THE WITNESS:** It's lower, certainly. We can agree on
18 that, yes.

19 **BY MR. LO:**

20 **Q.** All right.

21 And when we were talking about the distinction of \$500,000
22 between Android and iOS, you said that that put them in the
23 same equivalence class, correct, that that meant that Android
24 and iOS were in the same security equivalence class,
25 correct?

1 **A.** Roughly speaking, yes.

2 **Q.** Would you say a \$100,000 payout for the MacOS to a
3 \$2 million payout for iOS, would that still put them in the
4 same security equivalence class in your view?

5 **A.** Well, we are looking at apples and oranges here. Because
6 the first chart we looked at was mobile devices and then the
7 second one that we looked at was for desktop and servers OSs.

8 **Q.** I thought you told me a minute ago that you did not think
9 that different safety considerations applied for commuters and
10 mobile devices.

11 Did I hear you correctly previously?

12 **A.** That's correct. Yes.

13 **Q.** Okay. And so according to the Zerodium payout chart you
14 are looking at, would you agree that the difference in the
15 payout is significantly more for iOS than for MacOS?

16 **A.** That is true, although we would have to look at the market
17 dynamics affecting the two vulnerability markets.

18 **Q.** And using the logic you applied when you were just looking
19 at Android versus iOS, the 2 million-dollar payout for iOS
20 versus the \$100,000 payout for MacOS would suggest that iOS
21 is treated as being more secure than MacOS, using your logic,
22 correct?

23 **A.** Well, my logic was looking at the particular mobile
24 category. That's what's covered in my written report.

25 And so I think that's particularly relevant because I

1 think both sides, Apple in particular, is worried about,
2 well, iOS must be so much more secure. That's what Apple
3 will claim than Android. That's why I focused purely on the
4 the mobile pricing data.

5 **Q.** And even though you do an analysis of MacOS versus iOS --
6 well, first, let me ask a foundational question.

7 In performing your analysis, did you know that the
8 information on page four was there? Did you notice that when
9 you were doing your analysis?

10 **A.** I did.

11 **Q.** Okay. And so you saw that the data of the \$100,000 payout
12 for MacOS was there on the page before the 2 million-dollar
13 payout for iOS but you made a decision not to include that
14 in your analysis, accurate?

15 **A.** Well I thought it wasn't relevant to my determination.

16 **Q.** Okay.

17 Would you agree that the difference in the two prices,
18 meaning the \$2 million for iOS versus \$100,000 for MacOS, is
19 that consistent or inconsistent with your testimony on Friday
20 that MacOS is just as secure as iOS?

21 **A.** I think it is consistent.

22 **Q.** And would you agree though that the difference in relative
23 popularity and security is what explains the difference -- are
24 two of the reasons that explain the difference between the
25 high payout for an iOS vulnerability and the \$100,000 pay

1 out for MacOS?

2 **A.** Not necessarily.

3 **Q.** Not necessarily.

4 **A.** Even if that were true --

5 **Q.** Let's see what Zerodium says. We have gone to page 6,
6 we've gone to page 5, let's go to page 4 of the document.

7 And there -- I will ask, Mr. Eltiste, to put it up so we
8 can look at it together.

9 And there's a section there called Zeroduim payouts.

10 Do you see that, sir?

11 **A.** I do.

12 **Q.** Let's read the second sentence there, which says:

13 "The amounts paid by Zerodium to researchers to
14 acquire their original zero-day exploits depend on
15 the popularity and security level of the affected
16 software system as well as the quality of the
17 submitted exploit." And then there's a
18 parenthetical.

19 Do you see that, sir?

20 **A.** I do.

21 **Q.** So according to this document that you are relying upon,
22 the differences -- by the way, the prior sentence talks about
23 the fact that the exploits range from \$2500 to up to
24 \$2.5 million.

25 Do you see that, sir?

1 **A.** I do.

2 **Q.** So what Zerodium is explaining to the public on the
3 document that you relied upon is that they are giving
4 different prices in part based on how popular a particular
5 platform is and what the security level of that platform is.

6 That is what Zerodium is saying, correct?

7 **A.** Yes. It considers all those facts. That's right.

8 **Q.** But in reading these charts, and in noticing that there is
9 a \$1.9 million difference in the payout between MacOS and
10 iOS, you did not form a conclusion that perhaps one
11 explanation for the great difference in price is that one
12 platform may be more popular or that one platform may be more
13 secure than the other; you did not draw that conclusion from
14 this data, is that accurate?

15 **A.** I did not although just to make sure I understand the
16 question --

17 **Q.** You've answered the question.

18 **A.** Okay.

19 **MR. LO:** Your Honor, we would move what is in Tab 10
20 into evidence as Exhibit 5561, which is the next in number.

21 **MR. CLARKE:** Your Honor, I would raise the same
22 objection on the last exhibit.

23 **THE COURT:** Admitted, with the same limitation.

24 (Defendant's Exhibit 5561 received in evidence)
25

1 **BY MR. LO:**

2 **Q.** All right.

3 Sir, we've talked Star Wars, let's talk Enterprise now.

4 You gave some testimony about the Enterprise Program on
5 Friday, correct?

6 **A.** I did.

7 **Q.** And you understand that Apple imposes requirements for
8 participation in the Enterprise Program?

9 **A.** If I understand that correctly, Apple is the one who gets
10 to decide which businesses can participate in the program,
11 that's right.

12 **Q.** You mentioned in your response, but primarily the
13 Enterprise Program is intended for businesses to distribute
14 applications to their employees, correct?

15 **A.** Correct.

16 **Q.** And, in fact, it's not for any business, it's for
17 relatively large organizations with over 100 individuals,
18 correct?

19 **A.** Yes.

20 **Q.** Okay.

21 You understand that oftentimes in the business or the
22 Enterprise setting, the devices may sometimes be owned by the
23 employer. The employer will provide the iPhone or the iPad to
24 the employees. Yes?

25 **A.** That happens sometimes.

1 Q. That happens.

2 Would you agree that particularly in the instances where
3 the business is providing the device to the employee, they are
4 not likely to intentionally write a program that's going to
5 destroy the device? Would you agree with that?

6 A. I would hope that that's true.

7 Q. I would hope so, too.

8 Would you agree that in general, if the employer is
9 distributing applications to its employees, they are not
10 likely to write a program that's going to scam or physically
11 or mentally harm their own employees? You would agree with
12 that?

13 A. Well, I would say that I wish that was always the case,
14 but if you are an operating systems designer, you have to
15 assume the worst.

16 Q. I'm saying intentionally. I get that sometimes bugs get
17 through the program. Would you agree it is less likely for an
18 employer to intentionally write an app that tries to harm
19 their employees?

20 A. That's a plausible theory.

21 Q. Have you researched whether there have been instances of
22 abuse of the Enterprise Program?

23 A. There -- I am aware of some instances of abuse of the
24 Enterprise Program.

25 Q. You are aware of specific instances of abuse?

1 **A.** Yes. How are you defining abuse?

2 **Q.** Well, how did you define abuse?

3 **A.** A question has been met with a question.

4 So I am aware that there are instances in which companies
5 have used the Enterprise Program to distribute apps to people
6 who are not Enterprise employees.

7 **Q.** Okay.

8 Are you aware of any kind of malware or scams or
9 Phishing-type activity that occurred as a result of the
10 Enterprise Program?

11 **A.** Some of the incidents that I mentioned before, there were
12 concerns that the apps that were distributed collected too
13 much user information, yes.

14 **Q.** And when you say the apps collected too much information,
15 are you referring to the Facebook incident?

16 **A.** That's one of the incidents.

17 **Q.** What Facebook was doing with the Enterprise Program was it
18 was distributing apps to the general public, paying
19 individuals I think \$20 a month or something to that effect,
20 in exchange for tracking them in great detail, correct?

21 **A.** Correct.

22 **Q.** And that was an abuse of the program, correct?

23 **A.** Yes.

24 **Q.** Because it violated the rules about not distributing
25 outside of your organization, correct?

1 **A.** Yes.

2 **Q.** All right.

3 In the instances of bad apps, meaning scams or privacy
4 intrusions of the Enterprise Program that you're aware of,
5 would it be accurate to say that all of them occurred in the
6 context -- outside of the context of an employer/employee
7 relationship?

8 In other words, those are all of the company distributing
9 apps using the Enterprise Program to strangers and third
10 parties?

11 **A.** In all of the instances I've heard of of abuse, yes,
12 that's the setup.

13 **Q.** Right.

14 You've not heard of any instances of abuse where it's
15 actually the employer trying to scam or institute a privacy
16 intrusion on its own employees, correct? You are not aware of
17 any instances of that happening?

18 **A.** Correct.

19 **Q.** And so does that -- did that fact enter into your
20 consideration at all when you are advocating that the
21 Enterprise Program should be expanded beyond the
22 employee/employer relationship and permit anybody to
23 distribute apps to strangers? Did that -- did that fact come
24 into consideration?

25 **A.** I am not suggesting what you just suggested. I just want

1 to be clear about that.

2 I brought up the Enterprise Program merely to say that
3 there are already a variety of distribution channels that
4 exist on iOS, and the Enterprise model could act as sort of a
5 starting point for thinking about what a third-party channel
6 might look like.

7 **Q.** Okay.

8 You are actually -- just to be clear, you are not
9 advocating that the Enterprise Program should be used to allow
10 app developers to distribute apps to people outside the
11 organization; you are not advocating for that?

12 **A.** Right. Just to be clear, I'm saying it's a point in the
13 design space and we can think of other points in the design
14 space if we were to have third-party distribution channels on
15 iOS.

16 **Q.** All right.

17 Let's go back to your deck that you showed on Friday.

18 **MR. LO:** I will ask Mr. Eltiste to put it up. That's
19 PX0081. And I'm going to ask Mr. Eltiste to put up .9. And
20 we will all look at it together. If you want to take a look
21 at the paper version, it is on Tab 13 of your binder.

22 **THE WITNESS:** I can see it.

23 **BY MR. LO:**

24 **Q.** All right. Your conclusion in this case is that iOS
25 users would be just as safe even if app review did not exist,

1 correct?

2 **A.** Not quite.

3 I said that I believe that the app review provides
4 marginal additional security benefit to that which is provided
5 natively by the operating system.

6 **Q.** Fair enough.

7 And you think that the reason that app review provides
8 marginal value is that anything the app review does to keep a
9 user safe, the on-device mechanisms can accomplish almost as
10 good, correct?

11 **A.** Not quite. I would say that there are a series of
12 security mechanisms that the OS alone can enforce. Then there
13 are some other security properties which an OS cannot, but
14 also the app review struggles to provide those properties,
15 too.

16 **Q.** Okay. So when you say the things that the OS layer can
17 provide, we're talking about the portion that's in green on
18 the screen right now, the on-device security as you've marked
19 it?

20 **A.** Yes. If I understand your question, what we are looking
21 at is sort of the core foundation of the client side, security
22 mechanisms.

23 **Q.** And on Friday, if I heard you correctly, you called this
24 layer the most important layer for security, correct?

25 **A.** I believe that's right. Yes.

1 Q. Okay.

2 Would you agree that the on-device security measures that
3 we are looking at on the screen right now cannot protect users
4 from apps that could inflict mental or physical harm to
5 individuals?

6 A. I believe that's correct, although we are talking about
7 content moderation here, I believe, not about security.

8 Q. Okay. You called it content moderation so let me give you
9 a more specific example.

10 If an app encourages distraught teenagers to commit
11 suicide, would you agree that on-device security does nothing
12 to keep that app from the hands of iOS users? Would you
13 agree with that?

14 A. Well, once again, I want to distinguish between security
15 and content, but, yes, I do agree.

16 Q. And let's talk about content for age appropriate content
17 for children.

18 If an app is targeted to young children and asked them are
19 your parent home, and if not, where do they keep their
20 jewelry, would you agree that the on-device security
21 mechanisms you call the most important layer does nothing to
22 protect users from that kind of behavior?

23 A. That's correct.

24 Q. And what about scams? If an app pretends to be the Red
25 Cross and says we'd love to have you donate \$500 and it goes

1 off to some entity other than the Red Cross, you would agree
2 that the on-device security mechanisms we are looking at on
3 the screen does nothing to protect users from that type of
4 behavior, correct?

5 **A.** I would say the world that you are describing sounds a lot
6 like the MacOS world in as much as those exact same type of
7 apps can get on MacOS.

8 Yes, I agree.

9 **Q.** What about copycat apps and piracy, you are not rendering
10 an opinion that the on-device security mechanisms here do
11 anything to protect against piracy, correct?

12 **A.** It depends on what kind of piracy. This is mentioned in
13 my expert witness report.

14 **Q.** Let me just be clear about what kind of piracy.

15 **A.** Sure.

16 **Q.** You're a former Microsoft guy. Microsoft sells Word,
17 correct?

18 **A.** Correct.

19 **Q.** If somebody puts out a version of word that is free,
20 and -- to users, that's what I mean by piracy.

21 Would you agree that the on-device security doesn't know
22 whether the version of Word that I've download is real or not.

23 **A.** Correct.

24 **Q.** Okay.

25 What about fake reviews, do you agree that sometimes app

1 developers will give themselves thousands of fake reviews in
2 order to entice users to buy their applications?

3 You understand that that happens from time to time?

4 **A.** That can happen, yes.

5 **Q.** Would you agree that the on-device security mechanisms we
6 are looking at on screen that you call the most important
7 layer does nothing to protect users and developers from that
8 kind of behavior?

9 **A.** Well, there's a conflation here I just want to note for
10 the Court --

11 **Q.** Does it protect or does not it?

12 **A.** It does not, but you are not talking about core security
13 features, though.

14 **Q.** Fair enough.

15 You hit on my next point, which is that these are not, in
16 your view, core security features, correct?

17 **A.** Correct. Even though I think that --

18 **Q.** And, in fact, sir, in your report, do you recall what
19 you -- what phrase you used to describe apps that may inflict
20 physical or mental harm?

21 What was the phrase you used?

22 **A.** I don't think that I specifically used a phrase to talk
23 just with apps that may cause harm.

24 **Q.** You -- instead, you described all of the categories of
25 apps that we have been discussing for the last few minutes as

1 quality assurance properties, correct?

2 **A.** That's not quite right.

3 What I said in my report is --

4 **Q.** Let's take a look at your report.

5 **MR. LO:** I will ask Mr. Eltiste to put up 111. It is
6 in Tab 2 if you would like to turn to it on paper.

7 **BY MR. LO:**

8 **Q.** All right.

9 In paragraph 111 of your report, you start to enumerate
10 Apple's list of desirable app properties.

11 Do you see that, sir?

12 **A.** I do.

13 **Q.** And you helpfully tell us that security properties are
14 underlined, correct?

15 **A.** Yes.

16 **Q.** And other properties, which are not underlined, you refer
17 to as quality assurance properties, correct?

18 **A.** Correct.

19 **Q.** And now let's take a look at the next page where there's a
20 safety bullet point.

21 **MR. LO:** I will ask Mr. Eltiste to put that up.

22 **BY MR. LO:**

23 **Q.** Are you with me at the safety bullet point?

24 **A.** Yes, sir.

25 **Q.** Let's start at the bottom.

1 You write that an app must handle private user data
2 securely as required by the legal review step described below.

3 Do you see that, sir?

4 **A.** I do.

5 **Q.** That's underlined, yes?

6 **A.** Yes.

7 **Q.** That's a security property?

8 **A.** Yes.

9 **Q.** Let's go back to the first sentence:

10 "Broadly speaking, this review step attempts to identify
11 apps that could inflict mental or physical harm to users."

12 Do you see that, sir?

13 **A.** I do.

14 **Q.** That is not underlined, correct?

15 **A.** Correct.

16 **Q.** So that is not a security issue?

17 **A.** Correct.

18 **Q.** And instead, that is what you call a quality assurance
19 issue, correct?

20 **A.** Yes.

21 **Q.** And, in fact, you say that QA properties reflect judgments
22 about characteristics that make user interactions with an app
23 more enjoyable.

24 That's what you say in paragraph -- in the top of
25 paragraph 111. We will go back to the previous page.

1 Do you see that, sir?

2 **A.** Yes.

3 **Q.** And so you refer to apps that may physically or mentally
4 harm individuals as a quality assurance property -- or Apple's
5 attempt to search for those features as a quality assurance
6 property, correct?

7 **A.** As differentiated from the security properties I describe.

8 **Q.** Sure.

9 And because QA properties are about just making apps more
10 enjoyable, what you go on to write in paragraph 111 of your
11 report is that enjoyable is defined from the perspective of
12 Apple not from some universally accepted understanding of QA
13 properties.

14 Do you see that, sir?

15 **A.** I do.

16 **Q.** That's meant to suggest that some of Apple's things that
17 Apple looks for are rather arbitrary and capricious in your
18 view?

19 **A.** Kind of. I want to emphasize --

20 **Q.** Okay.

21 Would you say, sir, that Apple's attempt to prohibit apps
22 that may inflict mental or physical harm to individuals is not
23 a universally accepted goal?

24 Would you say that?

25 **A.** I think that you're taking some of these quotes out of

1 context.

2 Nothing in the report or in my testimony has said that
3 trying to provide, you know, some type of screening for
4 objectionable content is a known bat. I haven't claimed that.
5 Nothing in my report that says that.

6 **Q.** Thank you, sir.

7 **A.** If you look at what I'm talking about here --

8 **Q.** That's fine. Thank you.

9 Let's take a look back at your slides now, PDX81.3.

10 And this is a variation of the slide we have been looking
11 at for the past couple of minutes. And you have a note which
12 you talked about on Friday on app review.

13 Do you see that at the very top, sir?

14 **A.** Yes, sir.

15 **Q.** And your conclusion, which I believe you said a little bit
16 earlier in our session this morning, is that app review
17 provides minimal, if any, security benefits relative to what
18 iOS on-device security mechanisms provide.

19 Do you see that, sir?

20 **A.** I do.

21 **Q.** If someone were to take a broader view of security and say
22 that security encompasses trying to keep out apps that may
23 cause physical, mental, or financial harm to iOS device
24 users, would you still make the same statement that app review
25 provides minimal security benefits, if any?

1 **A.** I would not make that same statement.

2 **Q.** Sir, you are aware that if third-party apps -- if app
3 distribution were to be opened up and third parties had the
4 ability to distribute apps that may physically or mentally
5 harm individuals, that those apps would still be running on
6 Apple hardware, correct? They would still need Apple hardware
7 to run?

8 **A.** Correct, if they are iOS apps.

9 **Q.** If iOS app distribution were to be opened up to third
10 parties and developers had free rein to write apps that may
11 mentally, physically, or financially harm individuals, that
12 they would be able to do so using -- running on the iOS
13 operating system that's provided by Apple, correct?

14 **A.** Not necessarily. There are embodiments of third-party app
15 stores that would allow Apple to sanction or cut off access to
16 apps that contain extremely objectionable content.

17 **Q.** Okay. Well, let's talk about that and let's talk about
18 these policies then.

19 If Apple makes a policy determination that there should be
20 no native apps with pornography and a third-party app store
21 decides I'm okay with pornographic content, whose policy
22 should prevail in your view?

23 **A.** Well, I am not the Court. That's a --

24 **Q.** Do you have a view on that subject, sir?

25 **A.** Is this specific question about whether pornography should

1 be allowed on --

2 **Q.** No. The specific question is on, if in the instance where
3 Apple doesn't want native apps with pornographic content on
4 its devices, and a third party wants to distribute it, do you
5 have a view, as a security expert, which view should prevail
6 should Apple be required to get rid of its current app
7 distribution model?

8 **A.** I think it's a complex policy issue. So I think it -- you
9 know, I think the Court and the two sides would have to come
10 to some agreement on that.

11 **Q.** Okay.

12 And you're aware that Apple just released something called
13 app tracking transparency?

14 **A.** I am.

15 **Q.** There are many features, but one of the features is that
16 in order for an app to track a user, the user has to first opt
17 in.

18 Do you have that understanding?

19 **A.** Correct.

20 **Q.** Now, if Apple takes the privacy view that a user should
21 opt in before the app is permitted to track you, but a third
22 party app store or app writer thinks, no, the user should have
23 to opt out before I stop tracking, do you have a view on which
24 policy should prevail if Apple were required to open up iOS
25 app distribution?

1 **A.** It's a policy issue that, once again, the Court would have
2 to decide, but I would emphasize --

3 (Simultaneous colloquy.)

4 **Q.** Thank you.

5 You don't have a view on it, you would leave that to the
6 Court to decide, correct?

7 **A.** Yes. I just want to point out there's a spectrum of
8 third-party distribution channels.

9 **Q.** What about pirated software: If Apple makes a policy
10 determination that we don't want pirated software on our
11 devices because piracy hurts developers and there are
12 third-party stores that say we love to distribute pirated
13 software, do you have a view as a security expert as to which
14 policy should prevail?

15 **A.** I am personally against pirated software.

16 **Q.** But you don't have a view on which policy should prevail
17 were Apple forced to change its app distribution methods,
18 correct?

19 **A.** I think that if it were up to me, Apple should be allowed
20 to prevent pirated software from being on its platform.

21 **Q.** Well, you are aware, sir, that there are developers out
22 there who disagree with Apple's policy on preventing pirated
23 software, correct?

24 **A.** But that disagreement doesn't mean that we had to push
25 ourselves towards a maximalist, completely open third-party

1 distribution channel.

2 So I just want to make that spectrum clear because there's
3 a lot of implicit assumptions in this line of questioning.

4 **Q.** Okay.

5 **THE COURT:** You haven't provided an opinion with
6 respect to some middle ground.

7 **THE WITNESS:** Well --

8 **THE COURT:** Just yes or no. Have you?

9 **THE WITNESS:** No, I've only talked about the design
10 spectrum.

11 **THE COURT:** Right.

12 **THE WITNESS:** Yes.

13 **THE COURT:** Go ahead.

14 **MR. LO:** Thank you, Your Honor.

15 **BY MR. LO:**

16 **Q.** By the way, you do agree that some of Apple's app-review
17 policies are intended to protect developers in addition to
18 users, correct?

19 **A.** Protect them in what way?

20 **Q.** Well, for example, you would agree that banning pirated
21 software on iOS devices is one way to protect developers who
22 put in the hard work and write apps, correct?

23 **A.** Agreed.

24 **Q.** And you agree that enforcing rules against fake reviews
25 helps developers because it prevents bad developers from

1 scooping up business at the expense of good developers with
2 good apps, correct?

3 **A.** It would be nice if the app users provided that property,
4 yes.

5 **Q.** But you would agree that the goal of preventing fake
6 reviews is one that can further the -- further give benefits
7 to developers, correct?

8 **A.** Yes, although as I mentioned in my report, there's
9 controversy over whether the app-review actually provides
10 that.

11 **Q.** Let's actually talk about that because you have said that
12 at several points now.

13 Take look at paragraph 79 of your written direct. And
14 that is -- your written direct, again, is in Tab 1 of your
15 binder.

16 **MR. LO:** Mr. Eltiste, if you would put that up and we
17 can look at it together.

18 **BY MR. LO:**

19 **Q.** Your introduction to paragraph 79 says that Apple's review
20 process has been criticized by app developers who believe that
21 Apple enforces the review guidelines inconsistently.

22 Do you see that, sir?

23 **A.** Yes, sir.

24 **Q.** And in the next sentence, you refer to -- or actually you
25 put in bold, "copycat apps, scam apps, and review fraud."

1 Do you see that, sir?

2 **A.** I do.

3 **Q.** And this paragraph is meant to suggest that Apple's -- the
4 app reviews efforts to deal with these type of security issues
5 is, at best -- has at best mixed results; is that accurate?

6 **A.** Yes.

7 **Q.** Okay.

8 Now, sir, just a couple of minutes ago you confirmed for
9 me that in your view piracy, scam apps, and review fraud are
10 not security issues under your definition, correct?

11 **A.** Yes.

12 **Q.** And so for the purposes of determining whether the
13 on-device mechanisms can do all of the security things that
14 app review does, you chose a definition of security that does
15 not include copycat apps, scam apps, and review fraud,
16 correct? That was your definition for purposes of that
17 analysis, yes?

18 **A.** Yes.

19 **Q.** And, here, you are citing to an article about app reviews
20 ability to keep out copycat apps, scam apps, and review fraud
21 as an example of app reviews inability to enforce security
22 measures, correct?

23 **A.** No.

24 **Q.** No. Let's take a look at paragraph 11 of your written
25 direct.

1 **MR. LO:** And, Mr. Eltiste, you can put that up.

2 **BY MR. LO:**

3 **Q.** Now, here, you write that Apple's review guidelines do
4 enumerate some security properties that cannot be enforced by
5 an OS alone.

6 Do you see that, sir?

7 **A.** I do.

8 **Q.** And then the next sentence makes reference to some
9 empirical evidence that Apple's review process does a weak at
10 best job of enforcing those additional security guarantees.

11 Do you see that, sir?

12 **A.** Yes.

13 **Q.** And the citation here is to pages 21 to 27 of your written
14 report.

15 Do you see that?

16 **A.** I do.

17 **Q.** So now let's go back to the paragraph we were looking at,
18 which is paragraph 79.

19 And would you agree that your discussion about copycat
20 apps, scam apps, and review fraud appears on page 25 of your
21 written direct?

22 **A.** It does. Although --

23 **Q.** Okay.

24 And so when you were introducing the information on page
25 25 and 26 in your written direct, you were saying that this is

1 empirical evidence that Apple's app review does a bad job of
2 enforcing security measures.

3 That's what you said in paragraph 11, correct?

4 **A.** No. If you look at the pages that we are talking about in
5 question --

6 **Q.** Sir?

7 **A.** -- page 25.

8 **Q.** Does page 25 line up to what you reference in paragraph
9 11?

10 **A.** Paragraphs of page 25 line up to that. So you are pulling
11 a paragraph that wasn't covered by that. If we look at
12 other --

13 **THE COURT:** I actually don't understand that,
14 professor.

15 Paragraph 11 says it is supported by pages 21 through 27.
16 The next opinion is supported by pages 27 through 29.

17 So by your own estimate here, all of those pages, 21
18 through 27, support opinion number 11 and nothing else.

19 **THE WITNESS:** So perhaps I misunderstood what the
20 page numbers meant. The paragraph that we were just talking
21 about --

22 **THE COURT:** Do I not understand what your entire
23 direct testimony is, how it is structured?

24 If I look, you have a number of opinions, which I asked
25 each expert to do, which -- and the cross-reference for the

1 opinions gives me the page numbers.

2 So, do I need to strike paragraphs from your report now
3 because they don't, in fact, support what you tell me in
4 paragraph 11?

5 **THE WITNESS:** I don't think so. Although what I
6 believe is the confusion here is that on page 25, there are
7 paragraphs up at the top that are talking about what was
8 referred to in -- on paragraph 11. That's the paragraph that
9 Your Honor just read out.

10 **THE COURT:** All right. Mr. Lo.

11 **MR. LO:** Thank you, Your Honor.

12 **BY MR. LO:**

13 **Q.** Let's move on from paragraph 79 and go to paragraph 80
14 which we talked about earlier.

15 **A.** Okay.

16 **Q.** And this was the paragraph that talked about the 17 apps
17 and the two apps.

18 Do you recall that, sir?

19 **A.** Yes.

20 **Q.** The two apps that are referred to paragraph -- in
21 paragraph 80 are also scam apps because they relate to
22 financial fraud, correct?

23 **A.** Let's see here.

24 **MR. LO:** I'll ask Mr. Eltiste to just highlight the
25 sentence that is marked by footnote 11.

1 **THE WITNESS:** Yes.

2 **BY MR. LO:**

3 **Q.** Okay.

4 So here, too, you are giving another example of Apple's
5 inability to provide security features for app review and you
6 are doing so by pointing out that scam apps got through the
7 app-review process, correct?

8 **A.** These apps also involve fingerprint data. And so that's
9 actually a category of sensitive user data --

10 **Q.** Okay.

11 **A.** -- that was described earlier in my testimony.

12 **Q.** The problem with the apps, as you've described in your
13 report, is that they are financial fraud, correct?

14 That's something you described in your written direct?

15 **A.** Yes, yes. One problematic aspect of them is they involve
16 financial fraud.

17 **Q.** Thank you.

18 In -- and finally, professor, let's take a look at
19 paragraph 78 of your written direct.

20 This is the article we were talking about that said that
21 the iPhone app suffer from the same types of security
22 problems.

23 Do you recall that discussion?

24 **A.** Yes.

25 **Q.** All right. And, again, for this one you did not review

1 the actual apps that were referenced in the article, correct?

2 **A.** Correct.

3 **Q.** Okay.

4 But you did -- I think I heard you say the information in
5 the article was accurate?

6 **A.** I believe it was accurate, yes.

7 **Q.** Okay. You agreed with the author's conclusions, correct?

8 **A.** Yes.

9 **Q.** Let's actually take a look at what the author's conclusion
10 are, and the underlying article appears at Tab 8 of your
11 binder. And let's go to page -- the top of page 3.

12 **MR. LO:** And I will ask Mr. Eltiste to put that up so
13 we can look at it together.

14 **BY MR. LO:**

15 **Q.** Well, first, before we get into the details, do you
16 recognize what's in Tab 8 as the article that is cited in
17 paragraph 78?

18 **A.** I believe that it is, yes.

19 **Q.** Okay.

20 And let's take a look at the author's actual conclusions.
21 At the top of page 3 it says:

22 "Much of the blame falls on third-party app
23 developers that are contracted to build apps for
24 other companies, Bowne said."

25 You recognize that Bowne, B-O-W-N-E is the name of the

1 security researcher?

2 **A.** Yes.

3 **Q.** (reading)

4 "But ultimately the responsibility lies with the
5 companies whose names are on their apps."

6 Do you see that sir?

7 **A.** I do.

8 **Q.** Now let's turn to page 6 of this article.

9 And there's a paragraph that starts with "the problem."

10 Let me know when you are there.

11 **A.** There.

12 **Q.** All right.

13 "The problem with mobile-app flaws is that in Bowne's
14 experience, maybe 10 percent of companies that he
15 notifies of flaws in their apps will ever fix them.
16 That's better than a few years ago, Bowne said, when
17 2 percent of companies would fix the flaws and others
18 would threaten to sue him or call him a criminal."

19 Do you see that, sir?

20 **A.** I do.

21 **Q.** And you have no reason to doubt these conclusions in the
22 article, do you?

23 **A.** I do not.

24 **Q.** And you understand that what the plaintiff wants to do in
25 this case is to prevent Apple from controlling app

1 distribution and to put app distribution in the control of the
2 companies that Mr. Bowne says refuses to fix the flaws in
3 their apps.

4 You understand that that's the result that the plaintiff
5 is advocating for here?

6 **A.** No, I do not think that is the result the plaintiff is
7 advocating for.

8 **Q.** All right.

9 **MR. LO:** Thank you, Professor Mickens. I pass the
10 witness.

11 **THE WITNESS:** Thank you.

12 **THE COURT:** Redirect.

13 **MR. CLARKE:** Good morning, Your Honor.

14 **THE COURT:** Good morning, sir.

15 **REDIRECT EXAMINATION**

16 **BY MR. CLARKE:**

17 **Q.** Good morning, Professor Mickens.

18 **A.** Good morning.

19 **Q.** So, Professor Mickens, I want to start at the end there.
20 You were asked some questions about your use of the term
21 "quality assurance" in your expert report?

22 **A.** Yes.

23 **Q.** What did you mean when you used the term "quality
24 assurance" in your expert report?

25 **A.** So by that I just meant properties that the app review

1 checks for that are not covered by the security properties
2 that I was mentioning in my expert witness report.

3 Q. Now, Professor Mickens, you were asked about a scenario
4 where there's a conflict in views between Apple and a third
5 party app store over whether certain types of content should
6 be permitted.

7 Do you recall that?

8 A. I do.

9 Q. So, for example, you were asked about a conflict in views
10 over whether pornography should be permitted.

11 A. Correct.

12 Q. And you said that the determination over which views
13 should prevail is ultimately a policy decision; is that
14 correct?

15 A. That's correct.

16 Q. So from a technical engineering perspective, are there
17 technical engineering solutions that would allow for either
18 outcome?

19 A. For either outcome is either pornography being allowed or
20 not being allowed, for example?

21 Q. Correct.

22 A. The answer is yes. So I think that this is one of the
23 reasons I was discussing the variety of application
24 distribution channels on both iOS and MacOS as they
25 currently exist.

1 **THE COURT:** So, wait. Where is that in your written
2 direct? What paragraph are we talking about now?

3 **THE WITNESS:** Let's see.

4 **MR. CLARKE:** So, Your Honor, this is responsive to a
5 question that counsel asked in cross-examination. I'm
6 offering Professor Mickens an opportunity to provide a full
7 response to the question.

8 **THE COURT:** There's nothing new in this case. It
9 sounds like a new opinion.

10 **MR. CLARKE:** So, Your Honor --

11 **THE COURT:** It wasn't in your direct, right? Now I'm
12 getting something new?

13 **THE WITNESS:** Well, if you look in the written direct
14 testimony --

15 **THE COURT:** Right.

16 **THE WITNESS:** -- there's a section in there that
17 talks about the six different models and then offers some
18 observations about what the existence of these models means.

19 And so this is sort of speaking --

20 **THE COURT:** Give me a paragraph.

21 **THE WITNESS:** Okay. One second.

22 Do you know which tab the written direct is in? Is it Tab
23 1?

24 **MR. LO:** It's in Tab 1 of the binder I handed up.

25 **THE WITNESS:** Okay. Thank you.

1 **THE COURT:** This way I'll go back and read it.

2 **THE WITNESS:** So if we look at Section 10, so Section
3 X in the written direct report, where -- so that section is
4 titled Design Implications for Third Party App Stores on
5 IOS.

6 **THE COURT:** Okay. Thank you. Proceed.

7 **THE WITNESS:** Okay. So, right --

8 **THE COURT:** I'm asking him to proceed.

9 **THE WITNESS:** Sorry.

10 **THE COURT:** Let me get a question.

11 **MR. CLARKE:** Your Honor, I'd also just like to point
12 out paragraphs 22 and 23 of the expert report. That's not the
13 written direct, but the actual report.

14 **THE COURT:** Okay. Thank you.

15 **BY MR. CLARKE:**

16 **Q.** So the question was simply, in response to these policy
17 questions that Apple's counsel was asking you, I just wanted
18 to know from a technical engineering perspective whether there
19 are engineering solutions that would allow for either outcome.

20 **A.** There are. And a variety of outcomes in between.

21 So at a high level, there are envisionments for a
22 third-party app store that would still, for example, allow
23 Apple to make certain decisions about whether content is good
24 or bad despite the fact that applications are distributed via
25 third channels.

1 There is also another embodiment, which is sort of let's
2 say all the way to one end of a spectrum, where Apple gets to
3 make no decisions about which content is good and which
4 content is bad.

5 So just to be clear, I personally am not advocating a
6 specific solution whereby there is no content moderation, I'm
7 merely talking about these things from an engineering and
8 security perspective to say that there are a variety of
9 different embodiments of third-party distribution channels
10 that have a variety of different approaches towards, for
11 example, content like pornography.

12 **Q.** I specifically mentioned pornography, but I believe
13 counsel for Apple mentioned a few other categories. For
14 example, digital piracy, those sorts of things.

15 Is your answer the same for each of those categories?

16 **A.** It is. And we can think of it at a high level, the
17 notarization approach that we see on MacOS as sort of an
18 inspiration for a hybrid model, if you will.

19 Because in the notarization approach, what happens is that
20 Apple doesn't do a full content review, but it does scan for
21 malware. And you can imagine that there are similar types of
22 hybrid third-party distribution channel models in which Apple,
23 for example, scans for some type of particularly objectionable
24 content but doesn't exercise any other editorial decision.

25 **Q.** So, Professor Mickens, is content moderation something

1 that third parties are capable of doing outside of the iOS
2 app store?

3 **A.** I believe that it is and you do see that on other
4 third-party app stores in some cases.

5 **Q.** So, for example, if Sesame Street were to set up a
6 Childhood Literacy app store on iOS, is there any technical
7 constraint that would prevent them from streaming the content
8 on that app store to make sure it is appropriate and not
9 harmful for children?

10 **A.** There's no technical reason they couldn't do that. In
11 fact, that's an important aspect of the case.

12 Oftentimes implicitly people are wondering, well, what
13 incentive would a third party have to do any type of content
14 moderation in the third-party app store. That's a great
15 example of why that might happen.

16 Or let's say, for example, Disney. I have no stock in
17 Disney. I'm not advocating for them particularly. If they
18 were to have a third-party distribution channel, they would be
19 highly incentivized for reputational reasons to make sure that
20 no obviously objectionable content made its way to that
21 third-party app store.

22 **Q.** From a technical perspective, Professor Mickens, if some
23 sort of harmful or illegal content did make its way on to
24 iOS devices, are there any technical solutions that Apple
25 might have available to it to remove that content after the

1 fact?

2 **A.** The answer is yes. And we can see empirical examples of
3 these technical solutions already deployed.

4 So, for example, on MacOS, there are tools that MacOS has
5 to remove malware that happens to end up on a particular
6 machine. So even if iOS is opened up to third-party app
7 stores, Apple still fundamentally controls the client-side
8 operating system.

9 What that means is Apple, if it so desired, could
10 fundamentally turn off the spigot, if you will, on a
11 particular piece of obviously objectionable content. That's
12 all compatible with the third-party app store.

13 **Q.** Professor Mickens, you were asked a question about the
14 Levin book.

15 Do you recall that?

16 **A.** I do.

17 **Q.** There was some language quoted from the Levin book.

18 Do you recall?

19 **A.** This is the language about the prevalence of various
20 devices and what that means for malware distribution.

21 **Q.** And you noted that counsel for Apple showed you the 2013
22 version of the book not the subsequent version of the book.

23 Do you recall that?

24 **A.** Yes.

25 **Q.** What's the relevance of that to your opinion?

1 **A.** Well, I think if you look at what's happened since then,
2 then the MacOS and iOS platforms have become much more
3 popular.

4 So you see now more attacks on both of those platforms,
5 and I think you see, as a result, Apple is trying to improve
6 the security for both of those types of platforms.

7 And, importantly, as far as an outside observer can tell,
8 Apple puts just as much interest in securing iOS versus
9 MacOS despite the claim, it seems from some of the
10 questioning, that while MacOS devices aren't as common, so,
11 therefore, we should somehow not worry about securing them as
12 much.

13 **Q.** And I believe Apple's counsel noted that gatekeeper and
14 notarization were technologies that were both developed after
15 the later edition of the Levin book was released.

16 Do you recall that?

17 **A.** I do.

18 **Q.** What's your basis for your knowledge about gatekeeper and
19 notarization?

20 **A.** The basis for that knowledge is public-facing
21 documentation that Apple has put out about those two
22 technologies as well as the work of reverse engineers.

23 **Q.** You were asked some questions about Apple's speed at
24 remedying shortcomings after those shortcomings are
25 discovered.

1 Do you recall that?

2 **A.** I do.

3 **Q.** To what extent is that something that you took into
4 account?

5 **A.** So that's taken into account when I have a discussion in
6 my report about security cultures.

7 And in that discussion, I mention that Apple is not the
8 only company that has security positive security cultures.
9 And I mention at the beginning of my expert witness report
10 that Apple does have a reputation for security. And that is
11 not undeserved.

12 My only observation is that there are other companies that
13 are also trying to and I think actually achieving similar
14 levels of high security.

15 **MR. CLARKE:** If we could put PDX81.2 up on the
16 screen.

17 Could you go to PDX81.1. There you go.

18 **BY MR. CLARKE:**

19 **Q.** Professor Mickens, you were asked a series of questions
20 about Zerodium and Zerodium payment markets.

21 Do you remember that?

22 **A.** I do.

23 **Q.** Did the questioning concerning Zerodium implicate any of
24 the conclusions that appear on this screen here in any way?

25 **A.** It did not.

1 **MR. CLARKE:** If we could put up PDX81.15.

2 **BY MR. CLARKE:**

3 **Q.** Do you recognize this slide from your demonstratives,
4 Professor Mickens?

5 **A.** I do.

6 **Q.** So counsel for Apple asked you a series of questions about
7 the number of apps on a platform.

8 Do you remember that?

9 **A.** I do remember.

10 **Q.** I believe the Court at the end of the day on Friday asked
11 a similar question about the number of apps on a platform and
12 you responded by discussing scalability.

13 Do you recall that discussion?

14 **A.** I do.

15 **Q.** Okay.

16 So starting with the app store distribution channel that
17 appears all the way to the left here, if there were a large
18 number of new apps being distributed through this distribution
19 channel, what is your opinion on the scalability of the
20 off-device security layers?

21 **A.** Well, you know, absent any other change in the way that
22 that process is implemented, the scalability will get worse.

23 In other words, given the same number of reviewers with
24 the same number of hours that those humans can review things,
25 each app would get fewer amount of reviewer attention per app

1 review.

2 Q. To be clear, we are talking about the Mac App Store
3 distribution channel here?

4 A. That's right.

5 Q. What implications would that have for security through
6 that distribution channel?

7 A. Well, that would have a negative impact on the security.
8 To the extent that the app-review process can provide security
9 benefits, those benefits, at least when we look at the human
10 aspect of the review process, they are a function of how long
11 a human reviewer can look at the app.

12 So we already know empirically that there are scalability
13 issues with that aspect of the review process. And this is a
14 place where allowing third-party app stores would actually
15 spur more competition here.

16 It might give more eyeballs, more people who can look at
17 these apps and look for properties which even Apple says are
18 good property for apps to have. And it might also lead to
19 more innovation in the way that app stores screen for security
20 issues or performance issues or even content moderation
21 problems.

22 Q. So, Professor Mickens, looking at the middle category that
23 appears on this slide, the third-party distribution with
24 notarization, do you see that?

25 A. I do.

1 Q. How scalable would this distribution channel be in
2 response to an increase in a large number of new apps?

3 A. Well, here, roughly speaking, when we look at
4 notarization, we are -- Apple, I should say, is performing a
5 malware scan of an app. That's the main thing that happens
6 here.

7 And so if the volume of apps that were submitted via this
8 channel went up, there also might be some scalability issues
9 here as well, although the malware scan, that's an automated
10 process. So in some sense, it is easier to scale because you
11 can always buy more computers to run more malware scans.

12 Q. So between the two distribution channels, the first and
13 the second distribution channel, do you have a view as to
14 which is more scalable in response to a large number of new
15 apps?

16 A. I think the one in the middle, the notarization based
17 channel is the one that is easier to scale.

18 Q. So I want to ask about the third distribution channel that
19 appears on this page. This is distribution that does not
20 involve any kind of app review or notarization.

21 So in this distribution channel, are there any sort of
22 technical security techniques that iOS could adopt that
23 would protect people in the event that there were a large
24 number of new third-party apps being distributed through this
25 channel?

1 **A.** I think the answer is yes.

2 I think that iOS could adopt similar security mechanisms
3 to what MacOS already uses.

4 So, for example, iOS could use client-side malware
5 scanners to identify an objectionable content that happened to
6 have made it through whatever app review process or
7 notarization process, if any was used to distribute an
8 application.

9 And I would also emphasize that iOS also still enforces
10 those client-side security mechanisms that are present on
11 MacOS and which Apple seems to believe are helpful for
12 protecting users on that platform.

13 So it's really important to note that on MacOS today, we
14 have all three distribution models, and even in that third
15 model, there are still protections that Apple provides its
16 consumers. We could port those protections over to iOS as
17 well.

18 As a final note, I want to mention that what we are seeing
19 here are three points in the design spectrum for app stores.
20 These are not the only three envisionable points. And I just
21 want to reemphasize that because that point is so important.

22 There are a variety of different application models which,
23 once again, allow for various degrees of Apple to have
24 editorial control or the ability to implement malware
25 scanning.

1 Q. Professor Mickens, are there default settings that iOS
2 could adopt that would prevent people from inadvertently
3 downloading harmful content through that third channel?

4 A. Yes. So this is another aspect of the policy decision
5 that would have to be made if iOS were to be opened up to
6 third-party distribution channels.

7 You can imagine that iOS could ship with any number of
8 different defaults with respect to what types of channels a
9 user is allowed to download content from.

10 Q. Professor Mickens, you were asked a series of questions
11 about your access to confidential Apple information on Cross.

12 Do you recall that?

13 A. I do.

14 Q. In the field of mobile device security, is it generally
15 the case that security researchers require access to
16 confidential information in order to be able to draw
17 conclusions about the security features of a platform?

18 A. The answer is no. This is an extremely important point.

19 In the field of mobile security, oftentimes researchers
20 are asked to evaluate the security of a system that is
21 partially or totally closed source.

22 And the security community has designed a variety of
23 techniques to allow sound analyses in the absence of
24 information about closed source systems. This is an accepted
25 technique in the community.

1 And, furthermore, it is actually accepted by Apple who
2 runs a Bug Bounty Program, a Bug Bounty Program that allows
3 outsiders, people who don't work for Apple to analyze Apple's
4 partially closed source software and hardware and find errors
5 in it.

6 So even Apple understands that one does not have to be an
7 Apple employee to understand the security implications of
8 Apple products.

9 **Q.** As a general matter, do you believe that the
10 confidentiality that surrounds Apple security practices makes
11 the platform more secure?

12 **A.** In general, no, I do not think that confidentiality makes
13 products more secure.

14 That's true not just for Apple, but for other products as
15 well.

16 **Q.** Do you believe that the materials you reviewed in
17 preparing your report for this case were adequate to support
18 the conclusions you arrived at?

19 **A.** I do.

20 **Q.** You were asked a question about paragraph 79, page 25 of
21 your written direct.

22 **A.** Yes.

23 **Q.** What point were you trying to establish in this paragraph?

24 **A.** So the point that I was trying to establish in this
25 paragraph, and just as a reminder, thank you. So this is the

1 paragraph about the review process.

2 And so the point that I was trying to establish here is
3 that when we look at the full spectrum of the app review, it
4 involves checking for a variety of different characteristics
5 for applications. And so what we see here is that I enumerate
6 three different types of applications and say that, well, it
7 seems empirically there are problems with this.

8 Now, I think the point that was brought up by the opposing
9 counsel is that, you know, copycat apps, scam apps, and review
10 fraud don't fall under the security categories that I was
11 mentioning. But I think it is important when you are
12 considering the overall operation of the app review that it
13 seems like it has challenges along multiple parts of its
14 implementation and practice.

15 So that is what I think the main point of this paragraph
16 is, that when you look at the app review holistically, then
17 the properties it purports to provide, whether they be
18 security or otherwise, oftentimes are not provided.

19 **THE COURT:** Which company does it better?

20 **THE WITNESS:** Well, I would say it's tough in
21 general. It's tough in general.

22 So I want to be very clear about my testimony. I'm not
23 claiming that in-app review process sort of writ large, when
24 implemented by anyone, is ever going to be perfect.

25 I was tasked to look at security in particular, and I

1 found that the client-side OS is mostly responsible for
2 security. But as we were talking about with the opposing
3 counsel, there is this issue of content moderation or copycat
4 app, or things like that. It's important to note that opening
5 up iOS to third-party app stores doesn't mean we can't have
6 some of the other properties like checking for copycat apps or
7 content moderation or things like that.

8 My only claim is that if we were to allow those
9 third-party distribution channels, we wouldn't be punting on
10 the security issues because the security issues are mostly
11 enforced by the OS, which would be there regardless of the
12 distribution channel.

13 **THE COURT:** But in the industry today, is there
14 anybody who does it better for comparison?

15 **THE WITNESS:** I think -- no. I don't know anyone who
16 I could point to definitively and say, ah-huh, they definitely
17 do it better in all cases.

18 **THE COURT:** Thank you.

19 **MR. CLARKE:** No further questions.

20 **THE COURT:** Recross limited to the scope of redirect?

21 **RECROSS-EXAMINATION**

22 **BY MR. LO:**

23 **Q.** Professor Mickens, you mentioned Sesame Street as an
24 example of a store that would be able to curate apps and
25 content.

1 Do you recall that?

2 **A.** Yes.

3 **Q.** Would you agree that there are other stores out there,
4 such as Itch.io, that have very different standards of content
5 moderation than the Apples and the Sesame Streets of the
6 world?

7 **A.** That's correct.

8 **Q.** Okay.

9 And if app distribution were to be opened up, you
10 understand that both the Itch.io's of the world and Sesame
11 Streets of the world would be able to freely distribute their
12 apps for iOS, correct?

13 **A.** I don't understand that. Because there are envisionments
14 of third-party app stores that do not actually allow sort of
15 unfettered access to the platform.

16 This gets back to the policy question. This gets back to
17 the issue of what does the Court think is the best way to
18 handle this.

19 **Q.** So in your view, as a security expert, if app distribution
20 were to be opened up outside of the app store, you would
21 recommend that the Itch.ios of the world not be permitted to
22 distribute their apps for iOS devices?

23 **A.** I'm saying that's one point on the spectrum. And it's
24 important to realize that there's a spectrum. Because it's
25 not just binary. We either don't have third-party channels or

1 we do and then we just have this absolute mayhem where
2 anything goes.

3 **Q.** And in your view, as a security expert, who decides which
4 end of the spectrum we end up in in the world where Apple does
5 not get to centralize distribution?

6 **A.** Well, ultimately I think it is the Court who would decide.
7 I think the Court could consult with security experts and
8 people who are experts in content moderation.

9 **Q.** Okay. And is it correct that in terms of how to -- where
10 in the spectrum you end up, you're not offering any advice on
11 that particular issue. You are not offering any expert
12 opinions on that issue, correct?

13 **A.** Well, I would say the following: If we look at MacOS,
14 which currently already supports three different models --

15 **Q.** Sir, I am asking you on issues such as content moderation
16 in the world between -- in the spectrum between Sesame Street
17 and Itch.ios and the ones that are actually, you know, far
18 more extreme than Itch.io, you are not offering any
19 professional opinions in terms of where on the spectrum we
20 should end up should Epic prevail in this case, correct?

21 **A.** No, not quite. So what I was trying to explain is that we
22 know that Apple's already comfortable on MacOS with three
23 distribution channels --

24 **Q.** Sir, I am asking you if Epic were to prevail, should
25 companies like Itch.io be permitted to distribute apps on

1 iOS?

2 Do you have a view on that or is it your view that that's
3 for the judge to decide without any opinions by you to help
4 her in that process?

5 **A.** I, personally speaking --

6 **Q.** No, I'm asking you whether you rendered opinions in this
7 case that you believe would be helpful to the Court in
8 deciding that question.

9 Have you offered such opinions?

10 **A.** My opinion is that there is a spectrum of possibilities
11 along the engineering and security spectrum, and that from the
12 engineering and security perspective, it is possible to
13 support third-party channels.

14 **Q.** Sir, I'm not talking to you about the engineering
15 possibilities. I am asking you in terms of the policy
16 considerations on content moderation, have you offered any
17 opinion as a security expert on that topic that you think
18 would assist the Court in picking among that spectrum?

19 Yes or no?

20 **A.** I think that it would be --

21 **Q.** Did you or did you not, sir?

22 **A.** I am trying to offer it now.

23 **Q.** I'm not asking for you to offer it now.

24 I'm asking you whether you have offered that in your
25 written testimony or even in your expert report. You haven't,

1 have you?

2 **A.** No because my task was to evaluate the security of the
3 iPhone as it relates to the App Store.

4 **Q.** Thank you, sir.

5 **A.** Yes.

6 **MR. LO:** No further questions, Your Honor.

7 **THE COURT:** Anything on that topic?

8 **MR. CLARKE:** No further questions, Your Honor.

9 **THE COURT:** All right, professor, you're excused.

10 Thank you very much.

11 **THE WITNESS:** All right. Thank you very much, Your
12 Honor.

13 **THE COURT:** Next witness.

14 **MS. FORREST:** Your Honor, Epic provisionally, subject
15 to the various items that we mentioned this morning, has no
16 further witnesses to call in its case subject to rebuttal and
17 the other items we talked about earlier today.

18 **THE COURT:** All right. Thanks, Ms. Forrest.

19 Mr. Doren, your witness.

20 **MR. DOREN:** Your Honor, Apple calls Mr. Philip
21 Schiller.

22 **(SCHILLER, PHILIP, called as a witness for the Defendant,**
23 **having been duly sworn, testified as follows:)**

24 **THE WITNESS:** I do.

25 **THE CLERK:** Please be seated.

1 And scoot the microphone so it's under the shield there.
2 And then in a moment you can state your full name and spell
3 your last name.

4 **THE WITNESS:** Philip William Schiller,
5 S-C-H-I-L-L-E-R.

6 **THE COURT:** Good morning, Mr. Schiller.

7 **THE WITNESS:** Good morning.

8 **THE COURT:** You look a little bit different closer.

9 **THE WITNESS:** Thank you. I hope.

10 **THE COURT:** Mr. Doren, I'll let you get started. It
11 is 10:09 so we will take a break in six minutes.

12 **MR. DOREN:** Thank you, Your Honor.

13 May I proceed?

14 **THE COURT:** You may proceed.

15 **DIRECT EXAMINATION**

16 **BY MR. DOREN:**

17 **Q.** Good morning, Mr. Schiller.

18 **A.** Good morning.

19 **Q.** Where are you currently employed?

20 **A.** At Apple.

21 **Q.** And how long have you been with Apple?

22 **A.** Over 30 years.

23 **Q.** And what is your current position at Apple?

24 **A.** My title is Apple Fellow.

25 **Q.** And how long have you been an Apple Fellow?

1 **A.** Since this past August.

2 **Q.** August 2020?

3 **A.** Yes.

4 **Q.** What was your position prior to that?

5 **A.** Senior vice president of worldwide marketing.

6 **Q.** How long did you hold that position, sir?

7 **A.** Approximately 20 years.

8 **Q.** And have you had responsibilities for the App Store over
9 the years?

10 **A.** Yes.

11 **Q.** And when did those responsibilities first arise?

12 **A.** When we were first conceiving the App Store before it was
13 announced.

14 **Q.** And do you continue to have responsibilities for the App
15 Store?

16 **A.** Yes, I do.

17 **Q.** And could you describe briefly for the Court the nature of
18 your responsibilities related to the App Store over the years?

19 **A.** I have been responsible for helping define and create the
20 idea of the App Store, to help build the processes of the App
21 Store, created the app review team. I was responsible for the
22 worldwide developer relations team that also has a role
23 working with the App Store. For a number of years now I have
24 been responsible for the marketing and business teams of the
25 App Store.

1 Q. Thank you.

2 And does Apple have an executive team?

3 A. Yes, we do.

4 Q. Have you served on that team?

5 A. I have.

6 Q. How long did you serve on that team?

7 A. Again, approximately 20 years.

8 Q. And what is the role of the executive team at Apple?

9 A. The executive team are all the members of the different
10 functions of Apple that all report to our CEO. For example,
11 hardware engineering, software engineering, marketing,
12 finance, operations. And we meet weekly to discuss the
13 business of Apple.

14 Q. And you left Apple for a few years in the early 1990s; is
15 that correct?

16 A. That is correct.

17 Q. And what brought you back in 1997 or what brought you
18 back?

19 A. Specifically a call from Steve Jobs to ask me to come back
20 at a critical time in Apple's history.

21 Q. What year was that?

22 A. That was in 1997.

23 Q. And what was the financial condition of the company at
24 that time?

25 A. Apple was famously just months from being out of business.

1 Q. And did Mr. Jobs reorganize the company at that time?

2 A. He did.

3 Q. And did you participate in that effort?

4 A. Yes.

5 Q. Can you describe the reorganization please?

6 A. Yes.

7 Before Mr. Jobs came back in 1997, Apple was built by --
8 into divisions. It was organized by divisions. There were
9 product divisions like Macintosh, E-World, and then there were
10 market divisions like education and business. Each division
11 had a general manager and a P&L structure, and each was run as
12 individual somewhat independent businesses.

13 And when Mr. Jobs came back, and Apple was nearly out of
14 business, he changed that structure completely.

15 Q. And what was the -- what were the structural changes?

16 A. Well, we got rid of all the divisions. We reorganized the
17 company to a functional organization.

18 So, again, as I mentioned, hardware engineering, software
19 engineering, sales, marketing. Much as a start-up is
20 organized as a small business, and got rid of every general
21 manager, laid them off from the company, and had professionals
22 of each of these categories or functions report directly to
23 the CEO, and together all make decisions on all products as
24 one business.

25 Q. And prior to the reorganization, did each business

1 division maintain its own profit and loss statement?

2 **A.** Yes.

3 **Q.** And did that change with the reorganization?

4 **A.** It did.

5 **Q.** And how did it change?

6 **A.** We became one P&L for the entire company.

7 **Q.** And did you observe benefits from that change?

8 **A.** Yes. Many.

9 **Q.** What -- can you describe generally those benefits?

10 **A.** A few of those are that now we work together as one team
11 where we all worked on all of the products and we made
12 decisions on these products collectively because they were all
13 together under one P&L.

14 We would not compete with each other for just our quote
15 "slice of the pie" as one might say, and it meant that it was
16 a very collaborative process now. No one person could go off
17 in the direction in the business or on a product, it took all
18 of these functions working together under the CEO to decide
19 and implement every product we created.

20 **Q.** And you heard Mr. Sweeney's testimony about the benefits
21 of a functional organization that does not have specific
22 business units, didn't you?

23 **A.** Yes, I did.

24 **Q.** And did you hear Mr. Sweeney's testimony about the
25 benefits of a single company-wide profit and loss statement?

1 **A.** Yes, I did.

2 **Q.** Did you agree with that testimony?

3 **A.** Absolutely.

4 **MR. DOREN:** Your Honor, this would be a good point.

5 **THE COURT:** All right. We will stand in recess then
6 for 20 minutes.

7 Thank you.

8 **MR. DOREN:** Thank you, Your Honor.

9 (Recess taken at 10:15 a.m.)

10 (Proceedings resumed at 10:35 a.m.)

11 **THE COURT:** Okay. We are back on the record. The
12 record will reflect the parties are present. Mr. Schiller is
13 on the stand.

14 Mr. Doren, you may proceed.

15 **MR. DOREN:** Thank you, Your Honor.

16 **Q.** Mr. Schiller, were you at Apple when the development of
17 the iPhone was first considered?

18 **A.** Yes.

19 **Q.** And did you participate in Apple's decision to develop the
20 smartphone?

21 **A.** I did.

22 **Q.** Can you explain please why the head of marketing would be
23 involved in a product design or product selection process?

24 **A.** Sure. My role is now head of marketing but of a group we
25 call product marketing at Apple, and Apple Product Marketing

1 is completely involved in the definition, creation, and
2 management of all of our products. So it is absolutely part
3 of the official process in making a product that product
4 marketing is involved from the very beginning.

5 **Q.** Thank you.

6 And when did Apple start developing the iPhone?

7 **A.** In 2004.

8 **Q.** And when did the -- when was the first iPhone released?

9 **A.** 2007.

10 **Q.** And, sir, if you could please turn to Exhibit DX3426 in
11 your binder.

12 **A.** Yes. I have that open.

13 **Q.** Thank you.

14 And do you recognize this document?

15 **A.** Yes, I do.

16 **Q.** What is it?

17 **A.** This is our press announcement launching the iPhone.

18 **Q.** And the date is January 9, 2007; correct?

19 **A.** Yes, it is.

20 **Q.** And the press release states, "Apple today introduced
21 iPhone combining three products -- a revolutionary mobile
22 phone, a widescreen iPod with touch controls, and a
23 breakthrough internet communications device with desktop
24 class, email, web browsing, searching and maps -- into one
25 small and lightweight handheld device."

1 Can you explain what is being described here in terms of
2 the thought process underlying the creation of the iPhone?

3 **A.** Yes. When we were working on the iPhone, we had a few
4 goals in mind, things we were trying to accomplish. One was
5 we had had a -- our first real successful consumer electronic
6 device, the iPod, and the iPod was a breakthrough music
7 player, particularly at a time when -- when these music
8 players were transitioning from an old way, mechanical devices
9 like CD players, to new generation digital devices that had
10 software and computer chips in them, and it was a whole new
11 class of device.

12 So we were thinking about what would be another class of
13 device Apple could innovate and again as it transitions from
14 an old-styled product to a new generation software and
15 hardware-driven product. So that was one part of what we were
16 working on.

17 The second was we did have the iPod. It was a very
18 successful product at Apple, and we knew that one day people
19 might start to put their music on their phones and carry it
20 with them, and in that case, there wouldn't be the need for an
21 iPod, so we thought if anyone is going to kill the iPod, we
22 should do it ourselves with a new generation product.

23 And then third, the mobile devices we had at the time that
24 were somewhat smarter, like BlackBerrys and things, were not
25 very good at the internet. They could do email, they could do

1 messaging, but in terms of web browsing and the internet,
2 those were not experiences that were good on mobile yet. So
3 those were the -- sort of the three leading functions we were
4 trying to create with iPhone: A new generation phone, a
5 replacement for iPod functionality, and the internet in your
6 pocket.

7 Q. And you mentioned BlackBerry. Prior to the launch of the
8 iPhone, were there other mobile devices on the market?

9 A. Yes.

10 Q. Did any of them combine the features you just described?

11 A. No.

12 Q. And did Apple develop -- and, Your Honor, I would move,
13 please, Exhibit 3426 into evidence.

14 MS. FORREST: No objection.

15 THE COURT: Admitted.

16 (Defense Exhibit 3426 received in evidence)

17 BY MR. DOREN:

18 Q. And, Mr. Schiller, did Apple develop a unique operating
19 system for the iPhone?

20 A. Yes.

21 Q. And what were some of the technical challenges in doing
22 that?

23 A. We wanted to offer up for the first time an advanced
24 operating system for creating these rich experiences on a
25 mobile device, but what we had to work with previously, macOS,

1 was not appropriate at all. It was very large, it required a
2 lot of resources, storage, memory, compute power. It wasn't
3 very efficient for battery life in the way we would need for a
4 phone. It didn't connect at all with cellular networks or do
5 phone calling in any regard at all, and so what the team had
6 to do was redesign the operating system and start from
7 scratch, strip it down, remove everything they could to make
8 it work on a small device, and then build it up to the
9 capabilities that an iPhone would need.

10 **Q.** And were there any concerns specific to the fact that this
11 device was to be a mobile phone?

12 **A.** Absolutely.

13 **Q.** And can you describe those concerns, please.

14 **A.** There were many. As I said, one is it had to be a phone,
15 and it sounds simple, but a phone you rely on for making phone
16 calls and being connected and available to use all the time.
17 Other applications or uses can't get in the way of that
18 capability. It's -- it's core to it.

19 Secondly, it needs to work completely wirelessly on
20 cellular networks. Again, easy sounding thing, but on an
21 advanced new operating system and platform, pretty hard to
22 build and test as a global product that can roam from cell
23 tower to cell tower and stay connected, especially with data
24 uses as well.

25 And then of course it has to have small size, great

1 battery life while being a new generation powerful platform.
2 So there are many considerations that went into it, and
3 probably the most important of all of course is the security
4 and privacy issues. You're carrying this around in your
5 pocket.

6 **Q.** And can you describe a bit more the thought process around
7 the security and privacy issues, please.

8 **A.** Yes. The idea of this new computing device in your pocket
9 means it's capable of more new things. It's going to store
10 information around in our life that we're not used to having
11 all the time in our pocket. Simple example of course being
12 location data, knowing where you are, when you are, how long
13 you're in places is extremely personal, so these are highly
14 personal devices with a growing amount of information
15 available everywhere you go, roaming on other networks
16 everywhere you go.

17 **Q.** Thank you.

18 And does Apple license iOS to third parties?

19 **A.** No.

20 **Q.** And why not?

21 **A.** That's, you know, not the business we're in. Apple always
22 considers ourselves not a hardware company, not a software
23 company, but a product company. We make a product as a
24 complete experience of the hardware and software working
25 together to create a unique offering in the market. And as

1 such, the software is part of the product we're making. The
2 kind of company -- and there are others -- the kind of company
3 that licenses software for other -- to other companies is just
4 a very different kind of business model with different
5 tradeoffs.

6 **Q.** And I hear you alluding to those who make a different
7 decision. Have any of your competitors made a different
8 choice in terms of licensing versus not licensing their
9 software?

10 **A.** Yes.

11 **Q.** And who specifically?

12 **A.** Well, the two most that come to mind of course are Google
13 and Microsoft.

14 **Q.** And how did Apple evaluate the tradeoffs between choosing
15 between these different business model options?

16 **A.** Well, it's been our experience that a company that
17 licenses their operating system to other devices needs to
18 support a wide range of vendor products: Different chips,
19 different screens, different designs. And that's not saying
20 it's good or bad. It's a different model. But in our
21 opinion, it reduces the quality, it reduces the speed of
22 innovation because you're now supporting many other companies
23 who have different ideas of what they want to make.

24 You need to, as a vendor, support those ideas, and that's
25 the tradeoff we believe that comes about, is you just can't be

1 as fast and efficient at innovating and you just can't do it
2 as high quality, in our opinion.

3 Q. And we've heard discussion at this trial about a duopoly.
4 Do you recall that topic generally?

5 A. Yes.

6 Q. And as Apple's head of marketing for the last 30 years, is
7 that how you view the smartphone market?

8 A. No.

9 Q. How do you view the smartphone market?

10 A. We compete against many companies. It's a very big,
11 competitive market.

12 Q. And, Mr. Schiller, I'm hearing a little friction. I just
13 want to make sure nothing is --

14 A. Sorry.

15 Q. I'm sorry. I didn't mean to interrupt you.

16 A. So, in my view, in doing this work, we compete every day
17 with many, many companies from Samsung to Microsoft to Google
18 to Huawei to LG to Motorola, Amazon, on and on. There are
19 many competitors in this market.

20 **THE COURT:** In what market?

21 **THE WITNESS:** Mobile devices, mobile phones.

22 **BY MR. DOREN:**

23 Q. And at the time the iPhone was introduced, were there any
24 digital transaction platforms for the sale of software apps?

25 A. Yes.

1 Q. And can you name any examples for us?

2 A. Well, I know of two personally that I used at the time.
3 One is Steam, which we've talked about many times in this
4 case, and the other was actually for mobile apps called
5 Handango, and Handango is a -- was an online store for apps
6 for BlackBerry, PalmPilot, and other platforms.

7 Q. And what did Steam and Handango charge developers as
8 commissions at the time that the iPhone was released?

9 A. 30 percent.

10 Q. And aside from these early digital platforms, how did
11 developers distribute their games and other software?

12 A. Well, the most common way still at the time was through
13 physical distribution.

14 Q. And have you had personal experience in that area, sir?

15 A. A great deal.

16 Q. And can you describe that, please, generally.

17 A. Sure.

18 In making products for physical distribution, you, of
19 course, engineer the software. You usually license installer
20 and uninstaller software that you need to put together with
21 it. You put it on a CD. You design the CD. You design the
22 packaging. You design the manuals. You put that all
23 together, and you then take it through distribution channels,
24 stores like CompUSA and Fry's. And with them, you have to cut
25 deals for how much shelf space you get. People aren't aware

1 of that. You used to pay by what is called "facings." If you
2 have room for one box, two boxes, or three boxes, the more
3 facings, the better chance of a sale. You paid for things
4 called end caps to be able to market at the end of the row of
5 an aisle. You paid for weekend flyers. This was actually one
6 of the biggest demand drivers, was whether you paid for a
7 quarter, half-page, full-page ad in the weekend flyers that we
8 all got in our mailboxes back then. You had to cover all the
9 returns when you updated your software. On and on. There are
10 just many elements of that distribution.

11 **Q.** And what was the cost to the developer of that system?

12 **A.** Typically we'd see that the channel would get between 50
13 to 70 percent of the sale.

14 **Q.** And did that system remain the dominant means of
15 distribution for some years after the iPhone launched?

16 **A.** It did.

17 **Q.** Were there any third-party native apps on the iPhone when
18 it launched?

19 **A.** No.

20 **Q.** And was that a conscious decision on the part of Apple
21 management?

22 **A.** Yes.

23 **Q.** What was the reasoning behind that decision?

24 **A.** We thought that we wanted to create an Apple experience
25 with some built-in native apps from Apple and that the

1 security and privacy risks of opening it up to other native
2 apps was too great and not something that we could solve when
3 we launched the iPhone, so instead, we offered up the idea of
4 web apps.

5 **Q.** When you say the risk was too great, what do you mean?

6 **A.** I mean that it was too great to -- first of all, the
7 quality of the product. We're trying to deliver our first
8 generation iPhone with an entirely new operating system and
9 architecture. Getting that done was a huge task. There just
10 wasn't time to consider many third-party APIs and tools and
11 distribution.

12 Secondly was the security issues we've been talking about.
13 That unlike the Mac, which we were making at the time, we
14 believed that the risk of security and privacy for iPhone
15 users would be dramatically greater, and we did not yet know
16 how to solve for those and didn't have a program yet to deal
17 with it.

18 **Q.** And did the first iPhone include any native apps at all?

19 **A.** Just from Apple.

20 **Q.** And can you describe what those apps were?

21 **A.** Sure. There are many apps that we're familiar with today.
22 The phone app was an app experience, the Safari for browsing
23 the web, calendar, email, messages.

24 **Q.** And at some point, did Apple decide to permit third-party
25 native apps on the App Store?

1 **A.** Yes, we did.

2 **Q.** Presumably that's what we are all here to discuss this
3 month.

4 Were you involved in that decision, sir?

5 **A.** Yes.

6 **Q.** And when was that decision made?

7 **A.** Shortly after bringing to market the first iPhone, getting
8 it out into the world and to customers' hands, we then saw it
9 was helping the world and heard feedback that led us to decide
10 to make native app distribution a plan for the iPhone.

11 **Q.** And you mentioned what was going on in the world and
12 receiving feedback. Can you describe for us what the basis
13 for the decision was to take steps to facilitate third-party
14 native apps?

15 **A.** Yes. There are two things I recall from that time.

16 Number one, we did start to hear more feedback from
17 developers that they wanted the opportunity to create native
18 apps, not just web apps.

19 And secondly, we saw users and developers starting to try
20 anyway. They were creating what's called "jailbreaking," a
21 way to sideload software onto iPhone, and they were writing
22 apps without any documented APIs to build with that were
23 creating great quality risks, so we saw this beginning of
24 demand and quality and security risks on the iPhone.

25 **Q.** Is there anything wrong with jailbreaking in terms of your

1 perspective on the iPhone?

2 **A.** Well, from the perspective of a person responsible for
3 the -- what an iPhone is, the marketing of it, what it stands
4 for, yeah, there is a lot that I see wrong with it.

5 **Q.** Can you describe that, please.

6 **A.** Well, one, the software being created with undocumented
7 APIs becomes incredibly unstable and unreliable. These are
8 things that Apple doesn't know and never promised it should
9 work the way they're being used, it won't work the next time
10 the software gets updated, maybe the APIs are being used for
11 unintended purposes, and they give access into the system in
12 places that were not intended and risks the privacy and
13 security of the users, and so there -- I think there are great
14 risks to the iPhone when this started to happen.

15 **Q.** And did it also put the functioning of the iPhone itself
16 at risk?

17 **A.** Of course, yes.

18 **Q.** And, sir, when did Apple announce that it would be
19 proceeding with the creation of an App Store?

20 **A.** In late 2007.

21 **Q.** If you could please take a look at Exhibit 4566 in your
22 binder.

23 **A.** Yes. I see that.

24 **Q.** And do you recognize this exhibit?

25 **A.** Yes, I do.

1 Q. And what is it in?

2 A. This is Apple's news site. This is where we publish all
3 of our announcements to the press called "Hot News."

4 Q. Looking at the second item in this exhibit, what does it
5 address?

6 A. This is a letter from Steve Jobs to the world, to our user
7 community and to developers about our intention in this area.

8 Q. And what was the date of this document, of this
9 announcement?

10 A. October 17th, 2007.

11 MR. DOREN: Your Honor, I would move Exhibit DX4566
12 into evidence.

13 MS. FORREST: No objection.

14 THE COURT: Admitted.

15 (Defense Exhibit 4566 received in evidence)

16 BY MR. DOREN:

17 Q. And in the first sentence of that section, Mr. Jobs says,
18 "Let me just say it. We want native third-party applications
19 on the iPhone, and we plan to have an SDK in developers' hands
20 in February."

21 I believe we've heard the term "SDK" a time or two here,
22 but can you tell us what that of stands for?

23 A. Sure. That's Software Development Kit.

24 Q. And what is a Software Development Kit?

25 A. It includes a number of resources for developers to write

1 software, resources like the APIs that we have been talking
2 about, developer tools like Xcode. It includes documentation
3 to help understand the APIs and their functions. Often has
4 sample code to help a developer start to write their
5 application or learn how to use an API.

6 **Q.** And do the Software Development Kits -- are they made up
7 of Apple's intellectual property?

8 **A.** Yes.

9 **Q.** Does Apple require that its SDK's be used to develop apps
10 for iOS?

11 **A.** Yes.

12 **Q.** And does that remain the case today?

13 **A.** Yes.

14 **Q.** And who develops SDKs at Apple?

15 **A.** We have a software engineering team, a tools team, that
16 works under our head of software engineering.

17 **Q.** In terms of this initial SDK, how significant an effort
18 was that?

19 **A.** Tremendous.

20 **Q.** Can you describe that a bit, please.

21 **A.** For the better part of a year, the entire software
22 organization was working to create and document the APIs as
23 well as make the tools work with these new APIs on this new
24 platform for developers.

25 **Q.** And was the cost of that development work allocated to the

1 App Store in any way?

2 **A.** No.

3 **Q.** Has it -- has the cost of developing APIs ever been
4 allocated to the App Store specifically?

5 **A.** No.

6 **Q.** Turning back to Exhibit DX4566 -- first of all, is this
7 sort of advance notice that something is coming common at
8 Apple?

9 **A.** No. No. Very uncommon.

10 **Q.** What is Apple's more common practice?

11 **A.** We try more often to not announce software until we're
12 ready to release it to the world, at least in beta form
13 directly to developers so they can begin working on it
14 immediately.

15 **Q.** And why was a different approach taken here?

16 **A.** Well, as I mentioned, we were beginning to see these
17 jailbreak -- jailbreaking and sort of rogue app development
18 without documented APIs happening, and we were very concerned
19 that this would create unreliable, unstable devices, and this
20 was our way to quickly say *hold on, just wait, we're going to*
21 *address this and we want to give you something safe and*
22 *reliable to use.*

23 **Q.** And, Mr. Jobs goes on in that same paragraph to state, "We
24 are excited about creating a vibrant third-party developer
25 community around the iPhone and enabling hundreds of new

1 applications for our users."

2 Does that accurately capture your hopes for the App Store
3 as of October 2007?

4 **A.** Yes, it did. We were very careful in discussing and
5 deciding to use the word "hundreds" to set a reasonable
6 expectation of what we thought we could do.

7 **Q.** And Mr. Jobs then goes on to say in the second paragraph,
8 "It will take until February to release an SDK because we're
9 trying to do two diametrically opposed things at once:
10 Provide an advanced and open platform to developers while at
11 the same time protect iPhone users from viruses, malware,
12 privacy attacks, etc. This is no easy task."

13 Do you see that statement?

14 **A.** Yes, I do.

15 **Q.** And do you share that view?

16 **A.** Absolutely.

17 **Q.** Can you describe what the tension is between those two
18 diametrically opposed things?

19 **A.** Yes. I think this is the -- the core thing at the base of
20 all that we're talking about.

21 We want to create a more powerful, capable platform that
22 enables developers to create wonderful applications for all of
23 us, but we need to find ways to do it that helps to protect
24 users from this malware, from the threats that they're going
25 to receive, the attacks, and to try to keep your device

1 functioning properly. Again, this is not a general PC. This
2 is your phone in your pocket that needs to work reliably.

3 Q. And at the end of that same paragraph, Mr. Jobs says, "As
4 our phones become more powerful, these malicious programs will
5 become more dangerous, and since the iPhone is the most
6 advanced phone ever, it will be a highly visible target."

7 Did you agree with that statement back in 2007?

8 A. Absolutely.

9 Q. And is that still the case today, in your opinion?

10 A. I think it has only increased in this description since
11 then to today.

12 Q. And when did Apple launch the SDK for the iPhone?

13 A. In 2008.

14 Q. And did you participate in a launch event for the SDK?

15 A. Yes.

16 Q. Could you please turn to Exhibit PX0880, which,
17 Your Honor, I believe is already admitted in evidence.

18 THE COURT: Yes, it is. I remember this one.

19 MR. DOREN: Thank you, Your Honor.

20 Q. Mr. Schiller, do you have that exhibit in front of you?

21 A. I do.

22 Q. Do you recognize what it is?

23 A. Yes. This is a transcript of our launch event for the
24 iPhone SDK.

25 Q. And did Apple maintain these sorts of transcripts for

1 events like this?

2 **A.** Yes, we did.

3 **Q.** And can you help us -- so it's dated March 6, 2008. Was
4 that the date of the event?

5 **A.** Yes.

6 **Q.** And then there is kind of a code or a key, rather, with
7 initials and names. Can you describe what that -- what
8 function that serves, please.

9 **A.** Yes. With the transcript you'll see a letter initial and
10 then that corresponds to the names of the presenters here in
11 this table.

12 **Q.** So "S" being Mr. Jobs; correct?

13 **A.** Yes.

14 **Q.** And frankly the "S" being for Steve?

15 **A.** Correct.

16 **Q.** And "P" being for Phil Schiller and on down the line;
17 correct?

18 **A.** Yes.

19 **Q.** If you could look back at page 20, that being 00880.20,
20 about three-quarters of the way down the page, there are
21 statements by Steve Jobs. Do you see that?

22 **A.** Yes.

23 **Q.** And Mr. Jobs says, "So you are a developer and you just
24 spent two weeks or maybe a little longer writing this amazing
25 app, and what is your dream? Your dream is to get it in front

1 of every iPhone user and hopefully they love it and buy it,
2 right? That's not possible today. Most developers don't have
3 those kinds of resources. Even the big developers would have
4 a hard time getting their app in front of every iPhone user."

5 Do you remember Mr. Jobs saying that?

6 **A.** Yes.

7 **Q.** And was that statement accurate at the time?

8 **A.** Yes.

9 **Q.** And then he goes on to say, "Well, we are going to solve
10 that problem for every developer, big to small, and the way we
11 are going to do it is what we call the App Store."

12 And so was it important to Apple to treat big and small
13 developers the same?

14 **A.** Yes, it was.

15 **Q.** Why was that?

16 **A.** Well, previous developer programs by Apple and others in
17 our industry we found were increasingly being focused on just
18 the biggest developers, developers that could spend more
19 money, get access to more support, more resources, more
20 programs, and we thought there was an opportunity with the
21 iPhone to change our developer program to make it available to
22 a very wide range of developers from the very smallest,
23 individual students, to the largest corporations, and that was
24 a goal that we set up when we created this App Store.

25 **Q.** And has that philosophy ever changed?

1 **A.** No, it hasn't.

2 **Q.** If I could direct your attention to page 21, which is the
3 opposite page in your binder. About halfway down, there is a
4 single sentence paragraph where Mr. Jobs says, "So we think
5 this is pretty cool, and the App Store is going to be the
6 exclusive way to distribute iPhone applications directly to
7 every iPhone user."

8 Did I read that correctly?

9 **A.** Yes, you did.

10 **Q.** And is that an accurate statement as of March 6th, 2008?

11 **A.** Yes.

12 **Q.** And so from the outset, is it accurate that the App Store
13 was to be the only means to distribute apps on the iPhone?

14 **A.** Yes, it was.

15 **Q.** And what were the business reasons that Apple decided that
16 it would only distribute third-party native apps on its App
17 Store?

18 **A.** Well, we've covered a number of the important reasons to
19 us. Maintaining the quality of iPhone, maintaining the
20 security and privacy of our users were all critical to the
21 idea of opening it up for native apps.

22 **Q.** And have those priorities for privacy, security, and
23 reliability ever changed?

24 **A.** No.

25 **Q.** And has the need to safeguard those things changed over

1 time?

2 **A.** Yes.

3 **Q.** And can you describe how?

4 **A.** I think that over the years, the ways and methods
5 developers and bad actors try to get at users and their data
6 has only increased dramatically, and we see this from all the
7 important data we have. The many attacks and attempts to
8 steal it and get access to it have increased.

9 **Q.** And in the next paragraph, Mr. Jobs says, "Now people are
10 going to ask, 'Well, this is great, but what's the deal?
11 What's the business deal?'" And he states, "We think we've
12 got a great business deal for our developers. First of all,
13 the developers pick the price."

14 And was that an accurate statement back in 2008?

15 **A.** Yes.

16 **Q.** And why did Apple decide to let the developers pick the
17 price?

18 **A.** We had an existing store for music, the iTunes Music
19 Store. I think many of us all remember it. And how it was
20 innovative was it created one price for music, 99 cents for a
21 song, 9.99 for an album, and that helped grow the digital
22 music market.

23 When we started working on the App Store, we thought well,
24 that model doesn't work here. There are so many different
25 kinds of software applications that are going to be created

1 that we needed to make it easy for the developer to then pick
2 their price and not have just one price for all apps.

3 Q. And Mr. Jobs then goes on to say, "Pick whatever price you
4 want to sell your app at, and when we sell the app through the
5 App Store, the developer gets 70 percent of the revenues right
6 off the top and we keep 30 percent." Correct?

7 A. That's right.

8 Q. And is that what we've heard in this trial referred to as
9 kind of the 70/30 revenue share?

10 A. Yes.

11 Q. And was that the revenue share as of the launch of the App
12 Store?

13 A. Yes.

14 Q. And has that commission level ever been increased?

15 A. No.

16 Q. Are there instances where it's been decreased?

17 A. Yes.

18 Q. And if we could look back, sir, at page 27, .27.

19 A. Yes.

20 Q. Do you see at the bottom of the page the statement
21 attributed to you?

22 A. Yes.

23 Q. And at this launch event, you stated, "When I think about
24 the class of developers that will be using this store, I think
25 we really have come up with the best model for the two big

1 important classes. One is imagine you are just a free
2 developer, you want to give it to everyone for free. And the
3 other is" -- on the top of the next page -- "if you want to
4 generate some revenue and drive revenue for your app."

5 Those were statements you made back in March 2008?

6 **A.** Yes.

7 **Q.** And can you describe what you meant by "the two big
8 important classes"?

9 **A.** Yes. There -- right from the beginning we knew there
10 would be many developers who simply want to distribute a free
11 app, and there are many business reasons why to do so, and
12 then there are others that would like to use the App Store to
13 sell their app, and we want to create an easy, secure model
14 for doing that.

15 **Q.** And were there any other classes, if you will, of
16 developers at that time?

17 **A.** No.

18 **Q.** And what did Apple charge developers for free apps?

19 **A.** Nothing. There was no commission for a free app.

20 **Q.** And has that ever changed?

21 **A.** No.

22 **Q.** And how did the 70/30 revenue split that Apple set back in
23 March 2008 compare to other software commissions at that time?

24 **A.** Well, as we've discussed, there were two models at the
25 time. The physical model, this was much less than, on

1 average, about half, and then digital distribution, it was the
2 same.

3 Q. And in -- presently in terms of digital distribution, is
4 Apple's 30 percent commission still competitive?

5 A. We believe it is, yes.

6 Q. Now, do developers -- did developers back in 2008 or at
7 the time the App Store was launched -- did they have to pay
8 any credit card fees?

9 A. No.

10 Q. Did they have to pay any hosting fees?

11 A. No.

12 Q. Did they have to pay for any engineering costs?

13 A. No.

14 Q. Did they pay any fees for marketing and editorial support
15 from Apple?

16 A. No.

17 THE COURT: Did they pay for the SDKs?

18 THE WITNESS: We have two -- two programs then and
19 still now today. We have a free program for learning to
20 develop or developing in-house in an enterprise, and the
21 majority of developers who sign up are free. And then we have
22 the \$99 program.

23 THE COURT: So that engineering cost, do you think
24 that's something different when you said it was nothing?

25 THE WITNESS: Yes. We -- I'm just talking about all

1 the engineering Apple does. We don't charge them for our
2 engineering work.

3 **THE COURT:** Okay. Proceed.

4 **MR. DOREN:** Thank you, Your Honor.

5 **Q.** And other than the \$99 fee under the second contract,
6 under the DPLA, do the -- do developers of free apps pay
7 anything to Apple?

8 **A.** No.

9 **Q.** And does that remain the case today?

10 **A.** Yes.

11 **Q.** And if we could refer to page -- staying rather on page 27
12 and going up one entry to Mr. Jobs' statement immediately
13 above yours. Do you see that?

14 **A.** Yes.

15 **Q.** And Mr. Jobs says, "And also just to make it a little
16 clearer, we don't intend to make money off the App Store. I
17 mean, we don't make a lot of money off iTunes, and the split
18 with the music companies is about the same, so in the case of
19 the iTunes Music Store, we give all the money to the content
20 owners, and we are basically giving all the money to the
21 developers here. And if that 30 percent of it pays for
22 running the store, well, that will be great, but we just want
23 to create a very efficient channel for these developers to
24 reach every single iPhone user."

25 Is that a statement that Mr. Jobs made back in March 2008?

1 **A.** He did.

2 **Q.** Now, at the time that the -- of this announcement and at
3 the time that the SDK and the App Store was actually launched,
4 did Apple know whether the App Store would make any money?

5 **A.** No.

6 **Q.** And did Apple ever promise -- ever promise -- that it
7 would not make money?

8 **A.** No.

9 **Q.** Was it a risk for Apple to launch the App Store?

10 **A.** A huge risk.

11 **Q.** How so?

12 **A.** Well, we're in the first year here of the iPhone. It's a
13 tremendous success. People wrote it was the greatest product
14 launch ever. Exciting. People love it. And now we're going
15 to take this hot, new product with a new platform and we're
16 going to create something that we did not have, a new SDK, new
17 APIs, new kinds of applications, new distribution of software
18 with an App Store, all things that we did not have and had not
19 done before. We're taking our hot, new product and putting
20 something we have never done before on it, and we have no apps
21 yet so we have no idea how this is going to do.

22 **Q.** And did Apple create or perform any forecasts for the App
23 Store at the time of its launch?

24 **A.** No.

25 **Q.** How do you know that?

1 **A.** Because I would have been responsible to do those had we
2 done them.

3 **Q.** And if you could look, please, at page .30. And you will
4 see about the fourth entry down is attributed to Mr. Jobs;
5 correct?

6 **A.** Yes.

7 **Q.** And Mr. Jobs is responding to a question; is that true?

8 **A.** Yes.

9 **Q.** And Mr. Jobs says, "This is an international rollout.
10 Everything we do will be in all the countries we are in with
11 iPhones. This is not an open-source project. This is a
12 for-profit project. Even though we are providing this as a
13 free software update to all the iPhone customers, hopefully
14 people will think iPhones are even more valuable and buy more
15 of them."

16 Was that a statement that Mr. Jobs made?

17 **A.** He did.

18 **Q.** And in March 2008, did Apple hope that the App Store would
19 make money?

20 **A.** Of course we did.

21 **Q.** Let's jump ahead a couple of years, sir, and if we could
22 look, please, at PX417. Do you have that exhibit in front of
23 you?

24 **A.** Yes, I do.

25 **Q.** And do you recall --

1 **THE COURT:** It was previously admitted.

2 **MR. DOREN:** Yes, Your Honor. Thank you. Apologies.

3 **Q.** And, Mr. Schiller, do you recall seeing at least excerpts
4 from this slide during Epic's opening statement?

5 **A.** Yes, I do.

6 **Q.** And do you recall Dr. Evans testifying that Apple promised
7 never to make more than a billion dollars off the App Store?

8 **A.** I did hear that.

9 **Q.** Sir, first of all, you state here, "Do we think our 70/30
10 split will last forever? While I am a staunch supporter of
11 the 70/30 split and keeping it simple and consistent across
12 our stores, I don't think that 70/30 will last that unchanged
13 forever."

14 And then at the bottom in the last paragraph, you state,
15 "Just as one thought, once we are making over a billion
16 dollars a year in profit from the App Store, is that enough to
17 then think about a model where we ratchet down from 70/30 to
18 75/25 or even 80/20 if we can maintain a
19 one-billion-dollar-a-year run rate." You then say, "I know
20 this is controversial. I just tee it up as another way to
21 look at the size of the business, what we want to achieve and
22 how we stay competitive."

23 First of all, did I read all of that correctly?

24 **A.** Yes, you did.

25 **Q.** Can you tell us the context in which you wrote this email?

1 **A.** Yes. I am forwarding a *Wall Street Journal* article about
2 competition to app stores from things like web app creation
3 and distribution with HTML5, and that's spurring my thought of
4 there will be future competitors in the App Store, and we
5 should always be looking for them and thinking longer term
6 about what we may want to do, and I'm spurring conversation
7 about that.

8 **Q.** In fact, sir, if you could look, please, at page 0417.2,
9 in the second paragraph of the article you attached, the
10 article states, "That led to HTML5 being discussed as a
11 technology that could kill Apple's highly profitable App
12 Store"; correct?

13 **A.** Yes.

14 **Q.** And has Apple, in fact, taken steps to, as you put it at
15 the end, stay competitive in the -- in the digital storefront
16 environment?

17 **A.** Yes, we have.

18 **Q.** And what sorts of things has Apple done in that regard?

19 **A.** In many -- many ways, competition for us is about first
20 having more features for developers for better distribution,
21 bringing in more users to create a bigger place to sell your
22 software. It includes supporting developers with things they
23 request to make it a better program to enable the kinds of
24 businesses they want to run, and in some cases, it included
25 changing the commission model.

1 Q. And, sir, in terms of competition and competing -- I'll
2 call them app stores or app marketplaces -- have app stores or
3 app marketplaces continued to open since the launch of the App
4 Store?

5 A. Yes.

6 Q. And can you give a few examples, please.

7 A. Well, there are many of them. Certainly we've talked
8 about Google Play, Samsung's Galaxy Store. Huawei has a
9 store. Amazon is a very popular store. Microsoft has a
10 couple stores. And of course there are the -- the game
11 consoles. I consider them a competitor as well: Xbox,
12 PlayStation, Nintendo Switch. There are many, many
13 competitors for app distribution.

14 Q. So for purposes of digital game transactions on the App
15 Store, does Apple consider devices other than mobile devices
16 to be competition?

17 A. Yes, we do.

18 Q. Why is that?

19 A. Because as a user, you're -- you're considering buying
20 games to play, and you can choose to get them on a variety of
21 devices, and you're going to make decisions based on where the
22 fun games are and experiences you want, and so we think that a
23 user is going to consider these different places when they're
24 thinking about where they want to play and get their games.

25 Q. Now, we've heard a lot about app review. We've heard

1 about app review even this morning.

2 Was app review part of the App Store business model from
3 the outset?

4 **A.** Yes.

5 **Q.** And what apps were required to go through app review?

6 **A.** All apps.

7 **Q.** And if we could go back, please, sir, to Exhibit PX0880
8 and specifically to page 21. And at the very bottom, Mr. Jobs
9 comments on the page of page 21. Mr. Jobs states, "Now, will
10 there be limitations? Of course. There are going to be some
11 apps that we are not going to distribute -- porn, malicious
12 apps, apps that invade your privacy -- so there will be some
13 apps that we are going to say no to."

14 Did I read that correctly?

15 **A.** You did.

16 **Q.** And did -- was the app review process known to developers
17 from the very date of the launch of the SDK?

18 **A.** Yes.

19 **Q.** And the App Store?

20 **A.** Yes, it was.

21 **Q.** And if we could please take a look at a screenshot from
22 Exhibit DX4287.

23 And, Your Honor, this is in your binder, and we will
24 provide it to the Court. For the record, rather than the
25 entirety of DX4287, this is just a single screenshot. So I

1 would offer --

2 Well, first of all, Mr. Schiller, what are we looking at?

3 **A.** We are looking at a screenshot from the video of the
4 presentation that Steve gave to announce the App Store.

5 **Q.** And we see references to porn and malicious, as we've
6 talked about before. And what other categories did Mr. Jobs
7 identify back in 2008?

8 **A.** As you see in the slide, "illegal," "privacy," "bandwidth
9 hogs." We are very worried about network performance. And
10 importantly, "unforeseen." That this is going to be a
11 rapidly-evolving system, and we are going to learn more and
12 more about the things that are not okay on iPhone.

13 **Q.** And is it fair to say that the app -- that the app review
14 process was described in both qualitative and quantitative
15 terms back in 2008?

16 **A.** Yes, it was.

17 **MR. DOREN:** And, Your Honor, I would move to admit
18 this screenshot from DX4287.

19 **MS. FORREST:** No objection.

20 **THE COURT:** Admitted.

21 (Defense Exhibit 4287 received in evidence)

22 **BY MR. DOREN:**

23 **Q.** Mr. Schiller, I'd like to show you a slide from Epic's
24 opening. And do you recognize this slide?

25 **A.** Yes, I do.

1 Q. And it's entitled "Apple Develops A Plan." The subject is
2 "Yahoo widgets." It is from yourself to Scott Forstall on
3 January 21, 2008; correct?

4 A. Yes.

5 Q. And the pullout in the opening was the statement "the
6 whole plan we have in place." Do you see that?

7 A. I do.

8 Q. And the voiceover for this slide was that, "As all stories
9 do, this story has a beginning, and it begins when Apple
10 developed what, in its own words, it called 'the plan'." Do
11 you recall that?

12 A. I do.

13 Q. And do you recall the reference to "throwing away the
14 key"?

15 A. Yes.

16 Q. Let's take a look, please, sir, at PX0882, which,
17 Your Honor, I believe is also already admitted.

18 THE COURT: Yes. I show it as admitted.

19 MR. DOREN: Thank you, Your Honor.

20 THE COURT: And just a quick point on that for you
21 and Ms. Forrest, we did send an email. Because of the
22 tranches of exhibits that have been admitted by agreement, I'd
23 really appreciate a comprehensive numerical list because I've
24 only been tracking what I admit as opposed to what you all
25 agree to admit.

1 **MR. DOREN:** We will submit that, Your Honor. I must
2 admit, I was not checking email for 12 hours yesterday and
3 only saw it last evening, so we are getting that pulled
4 together with Epic.

5 **MS. FORREST:** We'll take care of it, Your Honor.

6 **THE COURT:** Thank you.

7 Proceed.

8 **BY MR. DOREN:**

9 **Q.** Mr. Schiller, do you have Exhibit PX882 in front of you?

10 **A.** I do.

11 **Q.** And do you recognize this as an email that you sent to
12 Scott Forstall on January 21, 2008?

13 **A.** Yes.

14 **Q.** And, first of all, can you describe where this is in the
15 timeline between the launch of the iPhone and the launch of
16 the App Store?

17 **A.** Yes. As we discussed, so the iPhone launched and started
18 shipping in mid 2007. In October of 2007, Steve wrote the
19 letter that said we're going to come up with a distribution
20 solution, but we haven't announced it yet. The events which
21 we were just discussing in March was the place where we now
22 announced the App Store. So this is just over a few weeks
23 before we hold that event.

24 **Q.** And, Mr. Schiller, can you describe the context in which
25 you wrote this email?

1 **A.** Sure. So Scott Forstall is our senior vice-president of
2 software engineering, responsible for developing the iPhone
3 software at this time. As part of that development, he had
4 worked with Yahoo on email integration for iPhone. We
5 announced that as part of the launch at iPhone. And so we had
6 a contact here with Yahoo, and in this time because we
7 announced distribution but not how we were going to do it yet,
8 an executive from Yahoo had reached out to Mr. Forstall and
9 asked whether we would consider their widgets software APIs
10 and architecture as part of that software stack on iPhone.

11 **Q.** And what was your position on that question?

12 **A.** I didn't think it was a good idea at all. We were worried
13 about the security and reliability of iPhone, and we were
14 weeks away from announcing what we did announce as our whole
15 strategy announcing an SDK, announcing a store, and making it
16 all work, and this is not part of that -- that idea at all and
17 not what we were going to launch.

18 **Q.** And you state in the second paragraph, "With one API
19 (ours), we can manage what is on our products and what is not.
20 If we open it up, then we don't sign all apps, we don't
21 distribute all apps, etc., which is the same as throwing out
22 the whole plan we have in place."

23 And what plan were you referring to, sir?

24 **A.** To have an SDK and an App Store and to review all apps and
25 make sure it was all safe and secure.

1 Q. This wasn't a monopolistic plot in January 2008?

2 A. No, sir.

3 Q. And when did Apple launch the App Store?

4 A. In 2008.

5 Q. And how many iPhones had been sold by that date?

6 A. I believe just over two million.

7 Q. And how many apps were on the App Store when it launched?

8 A. 500.

9 Q. And how did you feel about that at the time?

10 A. We were extremely excited. That exceeded our goal for
11 launching the App Store.

12 Q. And how many of those 500 apps were games?

13 A. I believe it was 131.

14 Q. And we mentioned before that this was to be an
15 international rollout. Does Apple have app stores,
16 storefronts, in different countries?

17 A. We do.

18 Q. How many different countries?

19 A. 175.

20 Q. Now, can a U.S. citizen, somebody who is living in the
21 United States, do business in, for example, the Italian App
22 Store?

23 A. Not unless they have a residence and payment model like
24 credit card in those -- in that country.

25 Q. And why is that?

1 **A.** It's part of the accounting and business that's been set
2 up with all of the stores that we have by law in each of these
3 countries, that the users of those stores need to be residents
4 of those countries.

5 **Q.** So as the head of marketing, it's your understanding those
6 are legal requirements in those countries?

7 **A.** Exactly. These are not for business purposes. There is
8 no business policy that we want it this way. It's how we've
9 been told we need to structure the stores.

10 **Q.** So I, as someone who isn't fortunate enough to own a villa
11 in Italy or own a credit card from an Italian bank, could not
12 do business on that storefront?

13 **A.** Correct.

14 **Q.** Or any other country other than the United States?

15 **A.** Correct.

16 **Q.** The Court asked you a couple of questions that went to the
17 developer program and the contracts between developers and
18 Apple, so let's turn to that.

19 Was a developer program put together or constructed by
20 Apple for iOS developers?

21 **A.** Yes.

22 **Q.** And were you responsible for putting that program
23 together?

24 **A.** I and my team, yes.

25 **Q.** And did Apple have a developer program before the Apple

1 Store launch?

2 **A.** Yes.

3 **Q.** And what -- to what developers did that program relate?

4 **A.** Mostly Mac developers.

5 **Q.** And how much did that program cost developers to join?

6 **A.** It had a few different tiers, but the one I recall is we
7 had a \$3,500 fee for developers to get the most resources from
8 it.

9 **Q.** And what were your priorities in modifying the program for
10 iOS developers?

11 **A.** We wanted to make it more affordable and more available to
12 a lot of developers, particularly younger developers.

13 **Q.** And what were your priorities in terms of benefits to
14 users regarding the development of the program?

15 **A.** Well, our hope is by making a program that was more
16 affordable with more resources for developers all the way --
17 all around the world, that it would result in more exciting
18 software for users.

19 **Q.** And if you could look, please, sir, at Exhibit 2 -- excuse
20 me -- PX2618, which, Your Honor, I believe is also admitted.

21 **THE COURT:** That looks familiar. I show it as
22 admitted.

23 **MR. DOREN:** Thank you, Your Honor.

24 **Q.** And, sir, if you flip past the page that says Exhibit J of
25 this exhibit, can you tell us what this document is?

1 **A.** This is our developer agreement.

2 **Q.** And the "Apple Developer Agreement" is what it's entitled?

3 **A.** Yes.

4 **Q.** And are the terms of this agreement standardized?

5 **A.** They are.

6 **Q.** And are large developers able to negotiate more favorable
7 terms than small developers?

8 **A.** No, they cannot.

9 **Q.** And what -- first of all, what's the purpose of this
10 document; in other words, who does Apple enter into this
11 contract with?

12 **A.** So this is an agreement for anyone who wants to start
13 developing with our tools and software. They get access to
14 our developer website and all of the content we have within
15 there and access to many of our tools they want to download
16 like our Xcode developer tools to begin development.

17 **Q.** And is this license targeted at people that want to put
18 apps on the App Store specifically?

19 **A.** Not specifically.

20 **Q.** So what sorts of developers are there that don't want to
21 put -- or would enter into this agreement alone?

22 **A.** Well, you could be a developer who's just learning to
23 develop and you want to start learning to code, and this would
24 be your first agreement and -- to get started. Or you could
25 be all the way to a large enterprise developer creating

1 internal applications within your company, and, again, this
2 may be what you need to get going and get your apps developed.

3 **Q.** Now, does Apple charge those developers a fee for access
4 to the tools provided under the Apple Developer Agreement?

5 **A.** No.

6 **Q.** Does anyone pay a fee for the tools provided under the
7 Apple Developer Agreement?

8 **A.** No.

9 **Q.** And if you could look, please, sir, at Exhibit 2622. This
10 document is entitled "Xcode and Apple SDKs Agreement." Do you
11 see that?

12 **A.** Yes.

13 **MR. DOREN:** And, Your Honor, I believe this is also
14 admitted.

15 **THE COURT:** Yes, it is.

16 **BY MR. DOREN:**

17 **Q.** And could you please describe the purpose of this
18 contract.

19 **A.** Well, this is a developer -- software development
20 agreement for somebody who wants to get access specifically to
21 these tools and a license to use these tools.

22 **Q.** And is there any charge to the developers for access to
23 these tools under this contract?

24 **A.** No.

25 **Q.** And do the two contracts we look at -- we've just looked

1 at -- do they restrict the use of Apple's intellectual
2 property?

3 **A.** Yes.

4 **Q.** And is acceptance of those restrictions required for use
5 of Xcode?

6 **A.** Yes.

7 **Q.** And Apple's SDKs?

8 **A.** Yes.

9 **Q.** Now, since 2008, how many developers have entered into the
10 developer agreement with Apple?

11 **A.** I don't know the cumulative total. I know the total right
12 now. We're at the point where we've got over 30 million
13 developers who have entered the Apple Developer Agreement.

14 **Q.** So just to be clear, there are 30 -- over 30 million
15 developers that have had free access to Apple's Xcode and SDKs
16 and the other tools provided under these contracts?

17 **A.** Yes.

18 **Q.** And if you could please look at PX2619. And this document
19 is -- and, Your Honor, I believe 2619 is also admitted.

20 **THE COURT:** It is.

21 **MR. DOREN:** Thank you, Your Honor.

22 **Q.** And, Mr. Schiller, this document is entitled "The Apple
23 Developer Program License Agreement"; correct?

24 **A.** Yes.

25 **Q.** And what is the purpose of this contract?

1 **A.** This gives developers access to additional sets of tools
2 and resources and technologies to develop apps, and it also
3 gives them the ability to then submit those apps to the App
4 Store and get support for managing their apps on the App
5 Store.

6 **Q.** So is this contract required or entering into this
7 contract required by developers who wish to place apps on the
8 App Store?

9 **A.** Yes.

10 **Q.** And how many people are current -- are currently enrolled
11 in the Apple Developer Program License Agreement? Let me
12 rephrase that.

13 How many developers are currently enrolled in this
14 contract?

15 **A.** We have approximately one million.

16 **Q.** And are the terms of this contract standardized for all
17 developers?

18 **A.** Yes.

19 **Q.** And are larger developers able to negotiate more favorable
20 terms than small developers?

21 **A.** No.

22 **Q.** And you've described it generally, but when comparing the
23 first contract we looked at, the developer -- the Apple
24 Developer Agreement, compared to the Apple Developer Program
25 License Agreement, what additional tools or APIs in general

1 are received under this contract?

2 **A.** You get access to more beta or pre-released software
3 through this program. You get access to some additional APIs
4 that have service components to them like push notifications
5 or HealthKit. They have extra security concerns as well. Or
6 Apple Wallet and Apple Pay so there is some extra things that
7 take additional work to support.

8 You also get access to TestFlight for distributing and
9 testing software. And tools for the App Store. For example,
10 for managing your apps on the store, running marketing
11 campaigns on the store, getting data analytics about how your
12 apps are running on the store. Those are all the kinds of
13 things that are additionally covered with this program
14 agreement.

15 **Q.** And do the terms of this license agreement restrict the
16 developers' use of those tools?

17 **A.** Yes.

18 **Q.** And are those restrictions a condition of entry into this
19 contract?

20 **A.** Yes.

21 **Q.** And is there a cost to developers who enter into the Apple
22 Developer Program License Agreement?

23 **A.** Yes.

24 **Q.** And what is that cost?

25 **A.** \$99.

1 Q. How often is that \$99 fee charged?

2 A. Once a year.

3 Q. And there are instances where individuals enter into these
4 contracts, there are instances where companies enter into
5 these contracts; is that true?

6 A. Yes.

7 Q. Can you tell us kind of how many people pay -- or how
8 often that the \$99 is charged in those scenarios?

9 A. Yeah. It's set up as a once-a-year program, and it
10 doesn't really matter how big the team is. It could be an
11 individual. It could be ten thousand developers. You can --
12 you set it up. Many companies just set it up for large teams.
13 Each one will have their own account and agreement. But it's
14 independent of whether -- what your size is or whether you
15 submit an app. We have developers who want these tools but
16 don't have apps in the App Store. And it's independent of
17 whether you have one app or you want to put, you know, a
18 hundred apps in the App Store. It's all the same.

19 Q. And how was the \$99 fee arrived at?

20 A. Well, when we looked at the previous program, which I
21 mentioned was upwards of \$3,500, we wanted to remove that
22 barrier, so to speak, and reduce it, but in the process, we
23 realized there were two important roles that \$99 paid that we
24 thought were beneficial to -- to users.

25 Number one was that this is part of the account

1 validation, that we want to go through a process to understand
2 who a developer is, are they really who they say they are.
3 Having a financial transaction with that developer is one of
4 many tools that we use to try to validate who the account is,
5 so it was helpful to that.

6 Secondly -- and Steve thought that it would be nice to
7 have a minimum amount that if you really want to be on the App
8 Store, it's important enough to you that you're willing to
9 spend \$99. Otherwise, if it's not that important, you might
10 be flooding the store with a lot of junk, and that's not what
11 users want. And so he thought that was a nice level set for
12 are you really serious about making a quality app on the Apple
13 store.

14 **Q.** When you refer to "Steve," is that a reference to
15 Mr. Jobs?

16 **A.** Yes.

17 **Q.** Was the \$99 annual fee also announced on March 6, 2008?

18 **A.** Yes.

19 **Q.** And has that fee ever increased?

20 **A.** No.

21 **Q.** Have the terms of who pays it and how often ever changed?

22 **A.** No.

23 **Q.** And, by the way, are there any entities or developer
24 populations that are exempt from the \$99 fee?

25 **A.** Oh, yes.

1 Q. And can you describe that, please.

2 A. There's no charge for this program for government
3 institutions, for education institutions, for non-profit
4 organizations. We waive it on all those groups.

5 Q. Thank you.

6 We've heard talk about the Worldwide Developer Conference,
7 but we haven't really discussed that in depth with anyone.

8 Are you familiar with the Worldwide Developer Conference?

9 A. Yes. I run it.

10 Q. And can you please describe what that is.

11 A. Well, we have a number of programs to help educate
12 developers, give them access to all of these APIs and tools
13 and help them create their software, and this is probably one
14 of the most notable parts of that program.

15 Once a year, usually in the summer, for decades now we
16 hold an annual conference that goes for a week long for our
17 developers.

18 Q. And what occurs at the conference?

19 A. We typically hold about 200 sessions each year. They're
20 all led by engineers. The whole intent of the conference,
21 it's engineers helping engineers, and so we have content we
22 create, 200 sessions.

23 Those sessions are videotaped and then shared around the
24 world for free to all developers to use as a resource to learn
25 how to use our APIs and ToolKits.

1 And then we also have hands-on sessions where a developer
2 can literally bring their code on a drive and sit down with an
3 engineer and be consulted on how to solve problems or design
4 some new interface or just get past the problem they're
5 having. So we have labs where they can explore some of these
6 new technologies and get help.

7 So it's a -- I think it's a great way for everyone to
8 become a better developer, make better apps.

9 **Q.** And how many people -- how many developers attend that in
10 person?

11 **A.** In person, six thousand.

12 **Q.** And is it streamed?

13 **A.** It is.

14 **Q.** And what is the live audience through streaming?

15 **A.** The keynote streams, and we get millions and millions of
16 views, over 25 million to sometimes close to 50 million now.
17 It's become very large.

18 **Q.** And does Apple pay all charges or all costs related to the
19 WWDC?

20 **A.** We do -- we do. Particularly now that it's been online
21 only for developers, it's been offered for free.

22 **Q.** How much does it cost Apple to put that annual event on?

23 **A.** Just that one event is over \$50 million.

24 **Q.** Each year?

25 **A.** Yes.

1 Q. And is that event charged against the App Store in any
2 way?

3 A. No.

4 Q. And I've heard of something called The Developers Center.
5 Are you familiar with that?

6 A. Yes.

7 Q. What is The Developers Center?

8 A. We're just completing a new building facility at Apple
9 Park in Cupertino that's designed entirely for supporting
10 developers as they come and get assistance developing their
11 applications and working on their next-generation projects.

12 Q. And is that part of the App Store budget?

13 A. It is not.

14 Q. Who's in charge of creating that facility?

15 A. We have a facilities team at Apple that is responsible to
16 build and maintain it.

17 Q. And does Apple run any school programs regarding
18 development?

19 A. Yes. We have a number of education programs.

20 Q. And are those charged to the App Store in any way?

21 A. No.

22 Q. Are you familiar with a program called Developer
23 Accelerator?

24 A. Yes.

25 Q. And what is that?

1 **A.** We've created some facilities around the world where more
2 advanced developers can come in and take part in programs led
3 by Apple to help them make their apps better and take
4 advantage of newer technologies.

5 **Q.** And are those programs charged against the App Store in
6 any way?

7 **A.** No, they're not.

8 **Q.** And we talked earlier about free apps, and roughly what
9 percentage of apps were free in the early years of the App
10 Store?

11 **A.** In the beginning, it was closer to 50 percent of the apps
12 were free.

13 **Q.** And today, what percentage of apps in the App Store are
14 free?

15 **A.** 84 percent.

16 **Q.** And what percentage of game apps are free today?

17 **A.** Approximately 75 percent.

18 **Q.** Now, we've heard talk about premium and paymium and paid
19 downloads. So when you say free games, what specifically are
20 you referring to?

21 **A.** Simply completely free, that there is no charge to the
22 user or in-app charges.

23 **Q.** And do developers pay any sort of commission to Apple to
24 distribute their free apps?

25 **A.** No, they do not.

1 Q. Can developers of free apps monetize their apps in any
2 way?

3 A. Yes, they do.

4 Q. How can they do that?

5 A. Number one way is advertising. A lot of developers,
6 particularly game developers, will use display advertising.
7 They will work with an ad network like with Google and place
8 ads and earn revenue from those apps.

9 Q. And when a developer monetizes their app through the use
10 of advertising, does Apple earn any money off of those
11 transactions?

12 A. No, we do not.

13 Q. Has it ever?

14 A. No.

15 Q. And how does -- and can a developer also make money off of
16 their app through the sale of physical goods and services?

17 A. Absolutely.

18 Q. And in transactions involving the sale of physical goods
19 and services, does Apple make any revenue from the developer?

20 A. We do not.

21 Q. And why doesn't Apple charge for a percentage or a
22 commission on the sale of physical goods and services?

23 A. We've thought from the start that the kind of an app that
24 requires some physical good -- use a simple example, an app to
25 buy a pair of sneakers. You order the sneakers in the app but

1 then they show up at your home. We don't know if they have
2 been delivered. We don't know if they are the color you want,
3 the size you want. That's really between you and that vendor,
4 that supplier, and we just thought from the beginning that
5 Apple is not completely involved in that experience and that
6 we would not have any commission on those sales.

7 **Q.** And do you have any understanding of the amount of revenue
8 developers earn through physical good transactions on an
9 annual basis?

10 **A.** Yes.

11 **Q.** And what is that understanding?

12 **A.** In 2019, the last study year I saw, it was over
13 \$400 billion.

14 **Q.** Billion dollars?

15 **THE COURT:** Million?

16 **THE WITNESS:** Billion.

17 **THE COURT:** Billion with a "B"?

18 **THE WITNESS:** Yes.

19 **BY MR. DOREN:**

20 **Q.** And does Apple receive any commission on any of those more
21 than \$400 billion?

22 **A.** No.

23 **Q.** And let's talk about -- we've heard about in-app
24 purchases, and were in-app purchases possible on the App Store
25 when it launched in 2008?

1 **A.** No.

2 **Q.** Why not?

3 **A.** Our model, when we started, was the idea that a developer
4 would want to sell their application, and so we created the
5 ability to pay before the user downloads for getting that
6 application if that's what the developer wanted, and that was
7 the only business model involving any transaction we created
8 for the store for the start of it.

9 **Q.** And did that change at some point?

10 **A.** Yes.

11 **Q.** Again, why we're here.

12 And why did that change; in other words, what prompted the
13 change?

14 **A.** Input from developers.

15 **Q.** And if you could please take a look at PX0888, which,
16 again, I believe is admitted, Your Honor.

17 **THE COURT:** I believe so, yes.

18 And, by the way, your teams did send us the spreadsheet,
19 so thank you for that.

20 **MR. DOREN:** Excellent. I had heard people were ahead
21 of me on that.

22 **THE WITNESS:** Yes. I have that open.

23 **BY MR. DOREN:**

24 **Q.** Thank you.

25 First of all, do you recognize Exhibit PX0888?

1 **A.** Yes.

2 **Q.** And it's an email with a deck attached; is that true?

3 **A.** Yes.

4 **Q.** And the email is from Mr. Ron Okamoto to Scott Forstall,
5 yourself, and Greg Joswiak. Could you please identify, other
6 than yourself, of course, each of these individuals?

7 **A.** Sure. Ron Okamoto worked for me running our Worldwide
8 Developer Relations Team.

9 Scott Forstall, who we have spoken about, Senior
10 Vice-President of Software Engineering.

11 And Greg Joswiak, my Vice-President of Product Marketing
12 at the time, running iPhone product marketing.

13 **Q.** And this email was sent on December 11, 2008; is that
14 correct?

15 **A.** That's right.

16 **Q.** And, again, can you just remind us where this fits in the
17 chronology of events around the App Store?

18 **A.** Yes. So the App Store is now up and running in its first
19 year, and we are just months into that new App Store.

20 **Q.** And the email states that, "Attached is a keynote preso."
21 First of all, what does that mean?

22 **A.** Keynote is the application we use at Apple for creating
23 presentations.

24 **Q.** And "preso" would be presentation?

25 **A.** It's short for that, yes.

1 Q. "Attached is a keynote preso outlining the various app
2 commerce models used by Microsoft, Xbox, Nintendo, Sony
3 PlayStation, etc. We've included summaries of other models
4 and developers so we can see the current scope of what's
5 offered. Let me know if you have any questions."

6 Did I read that correctly?

7 A. Yes, you did.

8 Q. This was a communication from Mr. Okamoto to you and your
9 colleagues?

10 A. Yes.

11 Q. And were you interested in receiving this information?

12 A. Very much so.

13 Q. And why in December 2008 did you care what the commerce
14 models were on MS, Xbox, Nintendo, and Sony PlayStation?

15 A. Because in our mind, these are competitive stores for
16 games, and it's directly relevant to the features we are going
17 to offer hopefully in our App Store.

18 Q. Let's take a look, please, at PX0888.3; in other words,
19 page 3 of this exhibit.

20 A. Okay.

21 Q. It's a page entitled "Current App Commerce Models." Do
22 you have that in front of you?

23 A. Yes.

24 Q. Can you describe what's on that page, please.

25 A. Yes. So this is a summary of the different app commerce

1 models available in the world on all these different platforms
2 broken up into four big categories.

3 Q. And one of those is "subscription"; correct?

4 A. Yes.

5 Q. And then the second is "download and install"?

6 A. Correct.

7 Q. And then "in-app"?

8 A. Yes.

9 Q. And "hybrid"; correct?

10 A. Yes.

11 Q. And under "download and install," there is a reference to
12 that being the most common commerce model; correct?

13 A. Yes, it was.

14 Q. Of these four, what were available on the App Store as of
15 December 10th, 2008?

16 A. Just download and install.

17 Q. And, by the way, I use that date because that's the date
18 of the deck; correct?

19 A. Yes.

20 Q. And if you could look, please, at page 4, this, again, is
21 entitled "Current Game Commerce Models." Do you see that?

22 A. Yes.

23 Q. And under "download and install," it states "easy to
24 leverage existing E-commerce infrastructure." Do you see
25 that?

1 **A.** Yes.

2 **Q.** What is that a reference to?

3 **A.** That means that the method of download, paying to download
4 up front and then install, can use the infrastructure of the
5 stores because that's what they've been built to deliver.

6 **Q.** And then two further down, it states -- well, it also
7 states, "Minimally invasive to the design of the game
8 architecture." What's that a reference to?

9 **A.** It simply means that the developer of the game doesn't
10 have much work to do because that's the easiest to implement
11 with an upfront payment.

12 **Q.** And then it states, "Most common model for games," as we
13 saw on the last page; correct?

14 **A.** Yes.

15 **Q.** And then "Least optimal user experience." And what did
16 that mean?

17 **A.** That paying up front is limited in what you can do to
18 create user experiences; that there will be other things that
19 we're going to talk about in these other models that are also
20 good user experiences that developers could take advantage of
21 if they existed.

22 **Q.** And then under "in-game commerce," Mr. Okamoto states that
23 "First of all, commerce solutions are custom built." And what
24 did you understand that to mean when you received this deck?

25 **A.** Meaning that the games that were starting to do this,

1 in-game commerce or in-app commerce, had to do it themselves;
2 that there wasn't a model from any of these stores to support
3 it.

4 Q. And then it goes on to say, "Requires the game be
5 architected to accommodate." What does that mean?

6 A. Again, if you want to do an in-app purchase to pay for an
7 item or a level, that's something you have to design to your
8 game, and so it's work.

9 Q. And then it states, "Not very common yet." Was that true?

10 A. Yes.

11 Q. And then "Provides superior user experience." And what
12 did you understand that to mean?

13 A. That with this in-game commerce, the opportunity is to
14 give users other options for playing and paying for just
15 things they wanted, when and if they wanted them.

16 Q. Now, as of December 2008, did the App Store have the
17 ability to facilitate in-app purchases?

18 A. No.

19 Q. As of December 2008, did the App Store permit app
20 developers to perform their own in-app purchases without the
21 involvement of the App Store?

22 A. No.

23 Q. And if you could please take a look -- we'll flip well
24 ahead, please, to page 25.

25 THE COURT: So some were doing it, but you didn't

1 allow it given that it says "not very common yet"?

2 **THE WITNESS:** Some were doing it on other stores. No
3 one was doing it on ours.

4 **THE COURT:** Right. Okay.

5 **BY MR. DOREN:**

6 **Q.** And, in fact, sir, if you look at slide 17 or page 17,
7 rather, of Exhibit PX0888 --

8 **A.** Yes.

9 **Q.** -- under Mega Man 9, this is in relation to the Nintendo
10 Wii device and store; correct?

11 **A.** Yes.

12 **Q.** And there it references "developer implemented in-game
13 store"; correct?

14 **A.** Yes.

15 **Q.** And then if you look at slide 18 regarding "In-game
16 commerce on Xbox 360 and PS3"?

17 **A.** Yes.

18 **Q.** There is a reference to Rock Band 2, and Mr. Okamoto
19 references "in-game commerce as leverages billing
20 infrastructure of Xbox Live and Sony PS3"; correct?

21 **A.** Yes.

22 **Q.** But this was not something that Apple permitted as of this
23 date?

24 **A.** That's right. We did not.

25 **Q.** Then if you could look, please, at slide 25, and this

1 slide is entitled "What Developers Are Asking"; correct?

2 **A.** Yes.

3 **Q.** And it identifies "subscription"; is that right?

4 **A.** Yes.

5 **Q.** And as of this date, did Apple provide subscription
6 services?

7 **A.** We did not.

8 **Q.** And then it also identifies what developers are asking,
9 once again, in-app commerce; is that right?

10 **A.** Yes.

11 **Q.** And then if you would look, please, at slide 27, which is
12 the summary. Can you please summarize Mr. Okamoto's summary
13 of what he was communicating to you all in December 2008.

14 **A.** Yes. The summary of this presentation was first that the
15 model that the App Store currently supported, download and
16 install, is still the same model widely supported on consoles.

17 Second, that the idea of an in-app purchase or in-game
18 commerce is just starting to come to fruition, and there
19 really wasn't anyone doing it systematically across their
20 stores in a way to measure a benchmark against.

21 And, third, and most importantly, that the developers that
22 we had spoken to, many here represented in the slide deck,
23 believe that if Apple were to create an in-app purchase model,
24 it would put us into a leadership position for an App Store
25 and specifically for iPhone and iPod touch.

1 Q. And around this December 2008 period, was Mr. Okamoto an
2 advocate for an in-app purchase capability?

3 A. Yes, he was.

4 Q. And why was that?

5 A. Well, he's responsible for our developer programs. His
6 job is at this time to work with all developers, support them,
7 and advocate for features and capability in our engineering
8 and our App Store to support what they would like to do.

9 Q. And if you could look, please, at page slide 29 or 088.29.

10 A. Yes.

11 Q. And do you see the heading "What Developers Want"?

12 A. Yes, I do.

13 Q. And then beneath that, there is a reference to APIs. Do
14 you see that?

15 A. Yes.

16 Q. Can you please describe what Mr. Okamoto was communicating
17 to you here?

18 A. Yes. He's proposing in this slide deck not long after the
19 store opened that we create a set of APIs for developers to do
20 in-app purchase as part of our iOS operating system and store
21 program to support developers to do in-app purchases.

22 THE COURT: Is he testifying?

23 MR. DOREN: Mr. Okamoto? No, Your Honor. He may be
24 in through deposition designations. I'm not -- I don't recall
25 with certainty.

1 **THE COURT:** Okay.

2 **MR. DOREN:** He's retired.

3 **Q.** And under the APIs, Mr. Schiller, the first is "scalable."

4 Do you see that?

5 **A.** Yes.

6 **Q.** And what's that a reference to?

7 **A.** Well, we want to make sure that this isn't a small
8 solution just for a few developers but something that can be
9 used by all developers.

10 **Q.** And the second is "Micro (sense) to macro (dollars) price
11 points." And do you understand what that means?

12 **A.** Yes. There were different needs by developers, and some
13 needed not only to have an in-app purchase at a full dollar
14 amount but to have microtransactions. I think that's a common
15 term in this industry. And for that, we also -- it's not here
16 in the slide, but we started talking about the idea of
17 intermediary currencies, that an in-app purchase can be either
18 for immediate purchase or to put in an amount that can then be
19 used for micro purchases.

20 **Q.** Did that morph into things like V-bucks in the future?

21 **A.** Exactly.

22 **Q.** And then there is a discussion of billing. What did you
23 understand developers to want in that regard?

24 **A.** The API that we create for in-app purchase to manage the
25 billing of that and payment of that -- of that transaction.

1 Q. We've heard Epic suggest that they would like to handle
2 that. Obviously Epic is a very large company. To your
3 understanding, was this function -- having this function
4 handled by the App Store important to smaller developers?

5 A. I think it was important to many developers but
6 particularly small developers.

7 Q. And then there is a reference to "subscription services"
8 which we'll talk about in a bit.

9 And then a reference to the process being secure. Did I
10 read that correctly?

11 A. Yes.

12 Q. And why was that important to developers?

13 A. Well, it's important to protect the value of their app and
14 their assets, that there's not fraud, and that a user gets
15 what they pay for but they're not defrauded by many users
16 getting access to services or features that they don't pay
17 for.

18 Q. And then there is a reference, a couple -- further down to
19 "enable fine grain control or quantity and frequency of
20 transactions." And what is that a reference to?

21 A. Well, it's a request for the API to allow the developer to
22 help manage the implementation of it specific to their app by
23 the range of the quantity, as it says, or how frequent a
24 transaction can be. And you can imagine that will matter as
25 we talk about subscriptions, the frequency of the transaction.

1 Q. And then we look to the right, and we see -- I won't call
2 it rudimentary because I don't know if it is or isn't, but we
3 see a diagram with one bar being "Commerce APIs" and then an
4 arrow pointing over to "Commerce Solution." Do you understand
5 what that's intended to communicate?

6 A. Yes.

7 Q. And what is it intended to communicate?

8 A. It seems rudimentary now, but at the time when nothing
9 existed, it took this kind of diagram and visualization to get
10 the proposal across that Ron was making.

11 The idea was that the store is the commerce engine,
12 commerce solution, and we want to create APIs for the
13 developer that they can put in their app to do in-app
14 purchases directly interacting with the store's commerce
15 engine.

16 Q. And then if you could turn the page, please, to page .30,
17 and, again, "Developers'," plural possessive, "requests for
18 commerce." Do you see that slide?

19 A. Yes.

20 Q. And there's a reference here or a heading here for
21 microtransactions with some bullet points under that. Do you
22 see that?

23 A. Yes.

24 Q. And Mr. Okamoto wrote in the first bullet point,
25 "Microtransactions, small one-time fee to enhance already

1 installed application." And at the time, what did you
2 understand microtransactions to be?

3 **A.** They're small transactions that can occur in an app that
4 you are already using, and they can be even less than whole
5 dollar amounts.

6 **Q.** And has the meaning of that term remained the same since
7 2008?

8 **A.** I believe so.

9 **Q.** And has that in fact become a business model for various
10 games?

11 **A.** Yes, it has.

12 **Q.** Including *Fortnite*; correct?

13 **A.** Correct.

14 **Q.** And after December 2008, did Apple take steps to address
15 these developer requests?

16 **A.** We did.

17 **Q.** And what did Apple do?

18 **A.** We began the engineering and store work to develop what
19 Ron was requesting here in a set of APIs and capabilities that
20 plug in together with our commerce engine to enable in-app
21 transactions and then later to enable subscriptions.

22 **Q.** And if you could please take a look at DX4192, which,
23 again, Your Honor, I believe has been admitted.

24 **THE COURT:** 4192. Let's see. It's not on my list.

25 **MR. DOREN:** 4192.

1 **THE COURT:** I don't see it on either list.

2 **MR. DOREN:** Okay. I will move it in then,
3 Your Honor, once we have it established.

4 I'm sorry. Apparently, Your Honor, the same document --
5 I'm sorry. It was entered by the expert stipulation on May
6 12th, Docket 635. I'm happy to move it in, Your Honor, just
7 to clear the record up now.

8 **THE COURT:** Okay. And I can't see the number on the
9 screen again.

10 **MS. FORREST:** And we would have no objection,
11 Your Honor.

12 **THE COURT:** All right. It's admitted. May I see the
13 number? 4192.

14 **MR. DOREN:** I'm sorry, Your Honor, 4192.

15 **THE COURT:** Yes. I do see it now.

16 **MR. DOREN:** Good. Thank you, Your Honor.

17 (Defense Exhibit 4192 received in evidence)

18 **BY MR. DOREN:**

19 **Q.** Mr. Schiller, do you recognize Exhibit DX4192?

20 **A.** I do.

21 **Q.** And what do you know it to be?

22 **A.** This is a transcript of another Apple event.

23 **Q.** And I notice your name is not on this in terms of being a
24 presenter. Were you present at this event?

25 **A.** Yes. I was sitting in the front row taking part in it.

1 Q. And what was the purpose of this event?

2 A. This was announcing what we call our developer beta of
3 iPhone Version 3.0 of the operating system.

4 Q. And this event occurred on March 17, 2009; is that right?

5 A. Yes.

6 Q. And the first speaker is Greg Joswiak; is that right?

7 A. Yes.

8 Q. Can you remind us what his position was at the time?

9 A. Vice-President of Product Marketing.

10 Q. At the bottom and carrying over to the second page,
11 Mr. Joswiak says, "This also, of course, provided a great
12 opportunity for app developers, and we first introduced the
13 beta of this iPhone SDK here on this stage just one year ago,"
14 which would be March 6th, 2008; correct?

15 A. Yes.

16 Q. He then goes on to say, "And in this one year's time,
17 we've had over 800,000 downloads of the free iPhone SDK";
18 correct?

19 A. Yes.

20 Q. And was that accurate at the time?

21 A. Yes.

22 Q. And then he goes on to say, "Absolutely amazing. And
23 we've had over 50,000 individuals and development companies
24 join our paid iPhone developer program." And was that also
25 accurate at the time?

1 **A.** Yes.

2 **Q.** So there were 800,000 downloads of the free iPhone SDK and
3 then 50,000 individuals that joined the developer program with
4 the \$99 annual fee?

5 **A.** Correct.

6 **Q.** And then he goes on to say, "It has gotten off to a
7 gigantic start, and if we look at these developers, I find it
8 very interesting that most of them, over 60 percent of them,
9 had never developed for any Apple platform before." And was
10 that also accurate at the time?

11 **A.** Yes.

12 **Q.** So these were developers who were able to take advantage
13 of this opportunity that Apple had created?

14 **A.** Exactly.

15 **Q.** And in the next paragraph, just under the "[applause]",
16 Mr. Joswiak goes on to say, "So clearly with the App Store
17 appealing to big developers, small developers, and those in
18 between, there's no surprise that we've had an explosion of
19 apps and we've had over 25,000 apps now in the App Store
20 today. Absolutely amazing." Was that accurate information as
21 well?

22 **A.** Yes.

23 **Q.** So at the end of the first year, after the SDK and App
24 Store was announced, there were 25,000 apps in the App Store?

25 **A.** That's right. We went from 500 to 25,000 in one year.

1 Q. And if you look over to page .003, just the next page in
2 the document, in the second paragraph, Mr.-- in the second
3 paragraph, Scott Forstall states that "Over 800 million
4 applications have been downloaded, and we've gotten so used to
5 calling those apps." Those are apps; right?

6 A. Yes.

7 Q. So "Over 800 million apps have been downloaded and this is
8 amazing, and it's the best way ever for developers to get
9 their applications out to our collective tens of millions of
10 users."

11 And was that an accurate number, the 800 million downloads
12 after one year?

13 A. Yes.

14 Q. And, in fact, in reference to the tens of millions of
15 users, if you go back to the first page of this same exhibit,
16 in the third paragraph, you see that Mr. Joswiak says, "And
17 before we ever shipped our first iPhone, we set a very
18 aggressive and public goal that we would sell 10 million
19 iPhones in our first calendar year, calendar 2008, and we blew
20 that number away. We sold 13.7 million last year in calendar
21 2008."

22 Is that an accurate figure?

23 A. Yes.

24 Q. And in the next paragraph, he states, "And if you look at
25 our iPhone sales from the time that we started shipping in

1 June of 2007 through the end of this last calendar year, you
2 see that we have sold 17 million iPhones." And is that also
3 an accurate figure?

4 **A.** That's correct.

5 **Q.** And that would be through the end of 2008?

6 **A.** Yes.

7 **Q.** And then in the -- again, back to page 3, .003, in the
8 third full paragraph which begins "But we've been listening."
9 Do you see that?

10 **A.** Yes.

11 **Q.** And Mr. Forstall says, "But we've been listening, and some
12 developers have come to us saying that there are other
13 business models they'd love to support for their
14 applications."

15 Do you see that?

16 **A.** Yes.

17 **Q.** And he says, "For instance, subscriptions"; correct?

18 **A.** Yes.

19 **Q.** And then further down in the paragraph, Mr. Forstall
20 says, "There are game developers who would love to add
21 additional levels and be able to sell game levels right from
22 within the game, and there's a lot of other new content that
23 developers like to sell inside an application."

24 Was that a statement that Mr. Forstall made back in March
25 2009?

1 **A.** He did.

2 **Q.** And then further down in that same paragraph, he
3 announces, "I'm happy to say that we are supporting all of
4 these additional purchase models in iPhone 3.0, and we are
5 doing it with what we call in-app purchase."

6 And was that also an announcement that he made back in
7 March 2009?

8 **A.** Yes, he did.

9 **Q.** And was this --

10 **MS. FORREST:** Your Honor, could I just say one
11 objection.

12 This is hearsay, and it's no problem if the witness adopts
13 the statement, but to the extent he's adopting a statement of
14 another would be hearsay, Your Honor.

15 **BY MR. DOREN:**

16 **Q.** Well, first of all, Mr. Schiller, was this document
17 created by Apple in the ordinary course of its business?

18 **A.** Yes, it was.

19 **Q.** And is it the practice of Apple to maintain accurate
20 transcripts of its various product launches?

21 **A.** Yes, we do.

22 **Q.** And is -- does this accurately reflect what was stated by
23 Apple personnel in the public launch of these -- of these new
24 offerings?

25 **A.** Yes, it is.

1 Q. And do you know, sir, the statements in this document to
2 be accurate?

3 A. Not only do I know they were accurate, I took part in the
4 writing of -- of the event of what these presenters presented.
5 I took part in the rehearsals and reviewing everything they
6 said, so I was an active participant in putting on the events
7 where these statements were made.

8 MR. DOREN: Your Honor, I would suggest, first of
9 all, this is a business record, and, secondly, the witness is
10 testifying independent of the document.

11 MS. FORREST: Your Honor, since he has now testified
12 independent of the document, the objection is withdrawn. It
13 was only when he was adopting Mr. Forstall's statements.

14 THE COURT: All right. Accepted as a business
15 record.

16 MR. DOREN: Thank you, Your Honor.

17 Q. Just a couple other questions, Mr. Schiller, on Exhibit
18 4192.

19 If you'd turn to page .004, at the -- in the carryover
20 paragraph at the top, Mr. Forstall says, "So in-app purchase:
21 The business model for in-app purchase is the same as for the
22 same as the App Store, meaning the developer sets the price
23 for in-app purchase items. Again, 70 percent of the revenue
24 goes straight to the developer. There are no credit card
25 fees. We will cover all the credit card fees, and the

1 developers are paid monthly."

2 Was that a statement that Mr. Forstall made at this March
3 2009 event?

4 **A.** He did.

5 **Q.** And can you tell us, sir, what the commission level was
6 that was set for in-app purchases at the time of this
7 announcement?

8 **A.** It was 70/30.

9 **Q.** As for -- previously set for paid downloads?

10 **A.** Exactly.

11 **Q.** And that was made public and announced at the time that IA
12 purchases -- that the company stated that in-app purchases
13 would be facilitated; is that correct?

14 **A.** Yes.

15 **Q.** And then in the next paragraph, Mr. Forstall says, "Now,
16 to keep the model simple for the consumer, this is for paid
17 apps only." Do you see that?

18 **A.** Yes.

19 **Q.** And is that how the in-app purchase feature was initially
20 offered by Apple?

21 **A.** Yes. That's how it began.

22 **Q.** And did that last very long?

23 **A.** Not too long in the grand scheme of it.

24 **Q.** And was that within a few months changed to apply to apps
25 that were free to download but then had in-app content?

1 **A.** Exactly.

2 **Q.** And what resources went into developing the in-app
3 purchase functionality?

4 **A.** It took work from our software engineering team to create
5 the APIs and support it with our ToolKits. And it took work
6 from the App Store Team to build a store component of it with
7 the commerce engine.

8 **Q.** And did any of the software engineering -- was any of that
9 charged to the App Store?

10 **A.** No.

11 **Q.** And did the development of IAP facilitate a new business
12 model called "freemium"?

13 **A.** It did.

14 **Q.** And can you describe what "freemium" is?

15 **A.** If a user downloads an app that is free to start to play
16 or use and then has the opportunity to make purchases within
17 that app with an in-app purchase, that's technically what is
18 called a "freemium app."

19 **Q.** And while we are defining our vocabulary here, are you
20 familiar with a business model called "paymium"?

21 **A.** Yes.

22 **Q.** What is that?

23 **A.** What Mr. Forstall was describing here is that is an app
24 where you pay up front and still have options to buy other
25 items or services within it and that is called "paymium."

1 Q. And what is the business model of *Fortnite* and Epic?

2 A. I believe it's freemium.

3 Q. What percentage of game apps on the App Store today use
4 the freemium model?

5 A. I believe it's 17 percent.

6 Q. And are the majority of the balance of games free?

7 A. Yes. As we said, approximately 75 percent of the games
8 are free.

9 Q. So that means something less than 10 percent are either
10 paid downloads or a paymium model; is that fair?

11 A. Yes. I believe approximately 6 percent are paid and then
12 the balance are paymium or subscription.

13 THE COURT: You said 75 percent of the games. So are
14 we talking about with these percentages just games or are we
15 talking about all apps?

16 THE WITNESS: I'm sorry. Just games, Your Honor.

17 BY MR. DOREN:

18 Q. And why, sir, based on your experience, would a developer
19 use a freemium model rather than a paymium model?

20 A. One of the very important things we discovered in building
21 IAP and then the rollout by developers using it for freemium
22 is that on average, we saw that a developer would increase
23 their customer base tenfold by going from paid to freemium.

24 Q. And so the net effect of the freemium model is to attract
25 a significant amount of new players?

1 **A.** Yes.

2 **Q.** And we have heard -- we've heard about IAP described now
3 as this in-app purchase business model. We've also heard of
4 it referred to as a functionality that Apple provides. Do you
5 have those two kind of different uses of the term in mind?

6 **A.** Yes.

7 **Q.** And you mentioned earlier what you called the -- the
8 commerce engine at Apple. Can you tell us what you were
9 referring to.

10 **A.** Yes. The App Store is sort of built with a commerce
11 engine that handles many of the responsibilities of
12 functioning and securing the App Store, and as I look at it,
13 IAP is one of the features that works with that commerce
14 engine.

15 **Q.** And what else is the commerce engine used for? And, for
16 example, do paid downloads go through the commerce engine?

17 **A.** They do.

18 **Q.** And do free downloads go through the commerce engine?

19 **A.** They do.

20 **Q.** If they're free, why do they go through the commerce
21 engine?

22 **A.** Well, you still want to make sure you have a valid
23 developer, safe developer account. You want to make sure you
24 have a valid user. We still protect our developers from
25 fraudulent users, even if they have a different business model

1 like advertising. We worry about the transaction and the
2 download of that application and to make sure that when you
3 later look at the App Store, the list of all the apps you've
4 acquired, even the free ones are listed there. The commerce
5 engine provides the information to support that. So there are
6 many functions that the commerce engine supports, even for
7 free apps as well as paid apps.

8 **Q.** And how do the IAP APIs relate to this overall commerce
9 engine?

10 **A.** The IAP APIs provide -- in this time provided a new
11 capability for developers to have a transaction and have the
12 App Store handle that transaction and then validate for the
13 developer that that has occurred and that the user has a right
14 to those goods or services.

15 **Q.** And has Apple created an SDK for developers who wish to
16 use the IAP functionality in the commerce engine?

17 **A.** We have.

18 **Q.** And what is the name of that SDK?

19 **A.** It's called StoreKit.

20 **Q.** And do you recall Mr. Sweeney testifying that Epic had no
21 complaints about how Apple handles initial paid downloads?

22 **A.** I did hear that.

23 **Q.** And do you recall that Mr. Sweeney testified that he had
24 no problem with the 30-percent commission that Apple charges
25 on those transactions?

1 **A.** Yes.

2 **Q.** Has Apple ever marketed IAP as a separate product?

3 **A.** No.

4 **Q.** Has anyone ever inquired about purchasing IAP from Apple?

5 **A.** Not that I've ever heard.

6 **Q.** Now, sir, you've spent 30 years marketing Apple products;
7 correct?

8 **A.** Yes.

9 **Q.** Does Apple have a process for developing products?

10 **A.** We do.

11 **Q.** And can you please describe that process.

12 **A.** I know it well. I helped write it. It's called the Apple
13 New Product Process, ANPP. It's an iOS industry standard
14 process which is important when we do business with
15 governments and other institutions. And Apple, in the product
16 process, defines every product we do with a rigid process for
17 the people who need to be involved in creating a product and
18 the phases every product goes through from concept to final
19 production and delivery, and so we have a formal process that
20 every product must go through.

21 **Q.** And has -- have the IAP APIs ever been put through a
22 process anything like that?

23 **A.** No.

24 **Q.** Sir, is IAP a product?

25 **A.** It is not.

1 Q. What is it?

2 A. It is a feature on our commerce engine for the Apple
3 store.

4 Q. And do the IAP APIs interact with other elements of the
5 commerce engine?

6 A. Yes, it does.

7 Q. And can you give us some examples of that, please.

8 A. Some of them are, as I described, it needs to know that
9 you have a valid developer. It needs to know that you have a
10 valid user. Worries about the protection of those accounts.
11 It needs to handle those transactions. And all of that is
12 supported by the commerce engine. It needs to understand if
13 there has been a refund to a user and whether it is still
14 available to use those services. And there are many other
15 functions as well.

16 Q. And we've heard talk at various times here about things
17 called parental controls and things referenced as "ask to
18 buy." Are you familiar with those?

19 A. I am.

20 Q. And do the IAP APIs interact with those functions in the
21 commerce engine?

22 A. Exactly. The commerce engine provides the ability to
23 handle things like "ask to buy" that you want to set up that
24 you have to be asked each time you make a purchase to protect
25 your purchases, and that commerce engine provides that

1 capability to all the payment choices, pay to download, in-app
2 purchase, subscription. Exactly.

3 **Q.** And do the IAP APIs interact with any fraud checks within
4 the commerce engine?

5 **A.** It does.

6 **Q.** And can you describe that, please.

7 **A.** Well, we have a team that manages looking out for
8 fraudulent transactions, fraudulent credit cards, fraudulent
9 trends from users or developers, and tries to protect those
10 transactions from occurring before they happen, if they can.

11 **Q.** And would -- and how do they do that? In other words,
12 what are they looking for?

13 **A.** They're looking at a lot of sources of data that use
14 machine learning models to project trends in major
15 transactions as they're occurring and understand a number of
16 variables that detect whether a transaction is fraudulent.
17 I'm not an expert in machine learning for fraudulent
18 transactions, but we have a team of people that that's what
19 they provide to the commerce process of the App Store.

20 **Q.** And is having a large dataset helpful in that process?

21 **A.** Absolutely. There are things you can't detect or see
22 unless you see a large number of transactions coming from a
23 user population or geography or across multiple applications.

24 **Q.** And if IAP or the administration of in-app purchase is now
25 moving away from APIs and back to this concept of in-app

1 purchases, if they were administered by different developers
2 on different platforms in different places, what would the net
3 effect be on the size of the dataset available to Apple to
4 evaluate fraud patterns?

5 **MS. FORREST:** Objection.

6 **THE COURT:** Which objection?

7 **MS. FORREST:** Your Honor, calls for speculation.

8 **THE COURT:** Lacks foundation. Sustained. It's also
9 leading.

10 **BY MR. DOREN:**

11 **Q.** Does IAP -- well, strike that.

12 Could Apple collect a commission without IAP?

13 **A.** Not that I can think of.

14 **Q.** Does IAP actually perform or -- perform the actual payment
15 processing function?

16 **A.** No.

17 **Q.** And who does that?

18 **A.** We -- we do business -- contract with payment providers
19 like Visa or Alipay or even carriers do payment processing.

20 **Q.** And does Apple pay the charges related to that service?

21 **A.** We do.

22 **Q.** Has Apple ever charged developers separately for IAP?

23 **A.** No.

24 **Q.** Let's talk about refunds for a moment.

25 We've heard some testimony about how Apple requires that

1 it handles refunds related to in-app purchases. Do you recall
2 that topic generally?

3 **A.** Yes.

4 **Q.** And is that accurate?

5 **A.** Yes.

6 **Q.** And why does Apple have that requirement?

7 **A.** We have a lot of customers of the iPhone and the App
8 Store, and many of them want to call Apple. They've gotten
9 the app from the App Store. They've taken the purchase
10 through IAP, and they want to reach out to us when they have a
11 problem with the developer and want a refund.

12 **Q.** And how many people within Apple are there to help
13 facilitate refunds?

14 **A.** Five thousand.

15 **Q.** And what area of Apple do they work in?

16 **A.** They work in our AppleCare Support Team.

17 **Q.** And has Apple taken any steps to increase the visibility
18 to developers in the refund process?

19 **A.** Yes, we have.

20 **Q.** Can you describe that, please.

21 **A.** We get feedback from developers about ways they would like
22 the refund process to improve, and last year we rolled out a
23 new feature to help developers with one of the big requests,
24 which is to help minimize fraudulent transactions with
25 refunds.

1 So you might understand that as a developer, you provide a
2 service to a user, and they pay for it within that purchase,
3 but then if they go to Apple and ask for a refund, they have
4 no longer really paid for that service, but the developer has
5 to continue providing it. So developers have asked us to --
6 how do we know if somebody has been refunded. We don't want
7 to keep providing that service. So we have created a
8 mechanism in our APIs to support that communication.

9 **THE COURT:** When was that? When in 2020?

10 **THE WITNESS:** At our developer conference last
11 summer.

12 **BY MR. DOREN:**

13 **Q.** And -- strike that.

14 And could -- let's turn to subscriptions. Could users
15 purchase subscriptions through the App Store when it first
16 launched?

17 **A.** No.

18 **Q.** And we've seen a reference to developer requests for
19 subscription services; correct?

20 **A.** Yes.

21 **Q.** And what was it that developers wanted in regard to
22 subscriptions?

23 **A.** Well, many developers have products and services that have
24 an ongoing need for revenue stream with them. It could be as
25 simple as a content service like music streaming or it could

1 be a -- you're a developer who is providing an app, and you
2 are going to continue to engineer updates for the customer,
3 and you think those updates are worth getting paid for on an
4 ongoing basis.

5 **Q.** And did Apple respond to that request?

6 **A.** We did.

7 **Q.** How?

8 **A.** Well, there were two steps to it. We have in-app
9 purchase, and with in-app purchase, developers were using them
10 for what's called non-recurring subscriptions. An example
11 would be the Major League Baseball app. I could use an in-app
12 purchase to pay for this season, but at the end of this season
13 it expires. I have to pay again. So it's a subscription, but
14 it doesn't recur. That was step one.

15 Step two, we rolled out subscriptions, and with
16 subscriptions, we added a feature where that in-app purchase
17 now can automatically renew, and so developers needed a range
18 of tools for that, like the ability to say what's the price
19 for a weekly, a monthly, or an annual subscription, and a
20 number of other features as well.

21 **Q.** And when were subscription services first offered by Apple
22 through the App Store?

23 **A.** I believe that was 2009.

24 **Q.** Would it refresh your recollection if I were to say 2011?

25 **A.** There goes my memory. Yes. 2011 is probably more

1 accurate.

2 Q. And are you familiar with something called "the reader
3 rule"?

4 A. Yes.

5 Q. And can you describe what the reader rule is?

6 A. It -- we had always set up the store as if you deliver a
7 digital service or good, that that needs to be paid for within
8 the app, but we had a number of developers say to us "I can
9 already get my own customers outside the App Store. I don't
10 need to do customer acquisition with you. I'm taking care of
11 that on my own. So can the consumer now have that content
12 experience in the app without having in-app purchase because I
13 took care of it off the App Store somewhere else." So we
14 created a rule to enable those businesses called "the reader
15 rule."

16 Q. And how does the reader rule work?

17 A. It says that okay, if you're -- I'm paraphrasing.
18 Probably not going to know the exact legal language of it or
19 language of it.

20 If you are acquiring a customer on your own and don't need
21 to do that in the store, you can do that, and -- and the user
22 can just, for example, log in with their account and get
23 access to all the content and digital services that they paid
24 for, and you're -- you're agreeing that you don't need do that
25 through the store, so there is no IAP, and that's the reader

1 rule.

2 Q. And does Apple receive any commission or other
3 compensation for those subscriptions?

4 A. We do not.

5 Q. And when was the reader rule put in place?

6 A. It was -- oh, my goodness. It's been a long time now.
7 2009 perhaps.

8 Q. And we heard testimony about how a -- an iOS device user
9 might manage a *New York Times* subscription. Do you recall
10 that topic generally?

11 A. Yes. That was mentioned.

12 Q. All right. So let's walk through a couple of scenarios.

13 If someone subscribes to the *New York Times* through the
14 *New York Times* website, how would they manage that
15 subscription?

16 A. Well, if you've paid for a *New York Times* subscription to
17 receive digitally on their website, when you download the app
18 and log in through your account, you can now get that content
19 from the *New York Times*.

20 Q. And if someone were to open a *New York Times* subscription
21 through the App Store, how would they manage that
22 subscription?

23 A. Well, now you're purchasing it in the app, and you're
24 doing it through the App Store with in-app purchase and
25 subscriptions, and you can manage that within the App Store.

1 Q. And if someone were to want to change from an iOS device
2 to some other device, say a Samsung Galaxy smartphone, what
3 would they do regarding their *New York Times* subscription?

4 A. So what happens next --

5 MS. FORREST: Objection to the form, Your Honor.
6 Foundation.

7 THE COURT: Overruled.

8 THE WITNESS: What happens next is up to the
9 developer. The *New York Times* can have a log-on and know that
10 you have paid for access to the content, and even if you
11 switch device, give you access to that content again.

12 BY MR. DOREN:

13 Q. And worst-case scenario, that is not available, what would
14 a subscriber do?

15 A. Well, in that case, you would cancel your subscription on
16 the iPhone on our App Store, and you would start up a new
17 subscription on your account on your other device.

18 Q. Now, you told us earlier that Apple has never increased
19 its commission level; correct?

20 A. Yes.

21 Q. Has it ever decreased its commission levels?

22 A. Yes.

23 Q. We just talked about subscriptions. Has the commission on
24 subscriptions ever been decreased?

25 A. Yes, it was.

1 Q. And can you describe that, please.

2 A. Yes. In 2016, we changed the commission model to be
3 different on the second year. So in the first year when
4 you -- a new user sets up a subscription, it's still a 70/30
5 commission, and then if that user stays with that
6 subscription, on the second year and all successive years, it
7 goes to 85/15.

8 In addition, when we made that change to the commission in
9 2016, we then automatically started any existing subscriptions
10 that were more than a year old for all developers at 85/15.
11 We didn't make them wait a year for those.

12 Q. Why did Apple make that change?

13 A. We -- first of all, subscriptions have been growing really
14 well for business for developers so we thought it was good for
15 developers and good for many kinds of products that users
16 want. And in talking with developers, we realized that they
17 had to do work in following years to keep the content coming
18 for users so that they want to stay with their subscription,
19 and so to support that and encourage that, because we think
20 it's good for the developer, good for Apple, good for the
21 user, we thought we would reduce the commission and recognize
22 that they're doing work to maintain that -- that content in
23 future years.

24 Q. And does that subscription model that you just
25 described -- does it apply to game apps that are sold on a

1 subscription basis?

2 **A.** It does.

3 **Q.** And have you heard of the Video Partner Program?

4 **A.** Yes.

5 **Q.** And what is the Video Partner Program?

6 **A.** It's a program we created a few years back. The Apple TV
7 Team was working on a new generation of an app on Apple TV
8 where new digital TV services were cropping up as separate
9 services, separate applications, and we wanted to bring them
10 all together into one experience for users.

11 And so the Apple TV Team started meeting with TV content
12 providers and described the work they were going to do to
13 integrate into this new experience. For example, they needed
14 to integrate with our Siri voice assistant so you could find
15 any show across any one of these app experiences, and in
16 talking with those developers, the Apple TV Team asked if we
17 could lower the commission on 85/15, not in the second year,
18 but in the first year to help them cover the costs of all this
19 engineering work. And so in doing that, we created a Video
20 Partner Program for any developer who wants to be in that
21 service and do that work to get that benefit.

22 **Q.** And what is required of a Video Partner Program member in
23 order to obtain that 15 percent commission?

24 **A.** Well, again, they need to join this program and do the
25 engineering work to integrate with the Apple TV app so the

1 users have a better experience.

2 Q. And when was the Video Partner Program created?

3 A. It's been a few years now. I don't remember the exact
4 year that that started.

5 Q. And are there any circumstances where Video Partner
6 Program participants are not required to use IAP?

7 A. Yes.

8 Q. And what are those circumstances?

9 A. When working with a number of these partners and in
10 particular some of the cable providers that were going
11 digital, they had existing movie rental businesses with an
12 install base of customers, and they asked if they could
13 maintain those existing relationships as they moved over to
14 digital distribution, so that's included as part of the Video
15 Partner Program as well.

16 Q. And is Amazon Prime one of those entities?

17 A. Yes, they are.

18 Q. And Altice One?

19 A. Yes.

20 Q. And I will not even attempt the French, Canal+?

21 A. Canal+, yes.

22 Q. Thank you.

23 And is IAP otherwise required for each of those companies?

24 A. Yes.

25 Q. And was the Video Partner Program only available to large

1 media companies?

2 **A.** No.

3 **Q.** Who else is it available to?

4 **A.** Any -- any developer who chooses to be in that business
5 can get access to the same program and the same terms.

6 **Q.** And we've heard testimony here about cross-platform play;
7 correct?

8 **A.** Yes.

9 **Q.** And cross-wallet play?

10 **A.** Yes.

11 **Q.** And has -- does Apple support both of those?

12 **A.** We do.

13 **Q.** And since when has Apple supported those?

14 **A.** Oh, it's been many years now that we rolled out the
15 multiplatform support for payment. I don't remember exactly
16 which year it started in.

17 **Q.** And was that decision based on anything to do with Epic?

18 **A.** No.

19 **Q.** And why did Apple decide to support cross-platform and
20 cross-wallet play?

21 **A.** Well, we had some game developers come to us and express
22 that this is a growing trend in gaming, that we're going to
23 see new developers come on to iPhone from consoles and other
24 platforms where they already had a large user base, and they
25 allowed cross-platform play, and that if we wanted to continue

1 to be competitive with the App Store, we needed to add that
2 capability. So hearing that feedback, we made that a term for
3 all developers.

4 **Q.** And does Apple's acceptance of cross-wallet play impact
5 the amount of commission paid to Apple by developers?

6 **A.** Sure.

7 **Q.** How?

8 **A.** Well, previously the rules had been that if there is any
9 digital content paid for within an app, that you pay for that
10 with IAP on iPhone. After the multiplatform rule, a developer
11 now can sign up users off of iPhone on whatever platform they
12 want and then the user can now have that content in their
13 iPhone, and there's no IAP process, there is no commission to
14 Apple.

15 **MR. DOREN:** Your Honor, is this a good time?

16 **THE COURT:** I was going to say we have one minute.

17 All right. Let's go ahead and stand in recess for 40
18 minutes until 1:15. Thank you.

19 **MR. DOREN:** Thank you, Your Honor.

20 **THE COURT:** I take it he will be the full day?

21 **MR. DOREN:** Certainly most of it. He may be on cross
22 by the end of the day, but I'm sure he will be on the stand.

23 **THE COURT:** Okay. Thank you.

24 (Luncheon recess was taken at 12:34 p.m.)

25 (Proceedings resumed at 1:15 p.m.)

1 **THE CLERK:** Remain seated. Court is in session.
2 Come to order.

3 **THE COURT:** Okay. We are back on the record.

4 The record will reflect that Mr. Schiller is on the stand.
5 Mr. Doren is at the podium. Ms. Forrest is writing furiously,
6 and she's present, as are the parties.

7 We may proceed.

8 **MR. DOREN:** Thank you, Your Honor.

9 **Q.** Mr. Schiller, you mentioned last year's worldwide
10 developer conference. When did that conference take place?

11 **A.** That was in June last year.

12 **Q.** And is there a set time for those conferences each year?

13 **A.** Yes, it is.

14 **Q.** And -- and that's in June of each year?

15 **A.** It is.

16 **Q.** Mr. Schiller, are you familiar with the small business
17 program?

18 **A.** Yes, I am.

19 **Q.** And what is the small business program?

20 **A.** It's a program on the App Store that allows developers who
21 have earned less than a million dollars in proceeds in the
22 previous year across all their apps to have a lower commission
23 level.

24 **Q.** And when had Apple first considered reducing its
25 commission for small developers?

1 **A.** Their original work started in 2016.

2 **Q.** And when did the small business program go into effect?

3 **A.** It -- we took applications from developers this past
4 December of 2020, and it impacted their commission levels in
5 this January of 2021.

6 **Q.** And if you could please take a look at Exhibit 5627, which
7 should be the last document in your binder.

8 (Exhibit published.)

9 **THE WITNESS:** (Reviewing document.)

10 I see that.

11 **BY MR. DOREN:**

12 **Q.** And do you recognize what this document is?

13 **A.** Yes.

14 **Q.** And can you describe it for the Court, please?

15 **A.** It's an email discussion among a few of us working on a
16 version of this program.

17 **Q.** And is the re line on this email "In Re Indie Developer
18 Program"?

19 **A.** Yes.

20 **Q.** And what's the date of this email?

21 **A.** The newest email on this is June of 2018.

22 **Q.** And in the first email, the first two emails, actually,
23 you discuss the possibility of some of the commission payment
24 being diverted, if you will, to search ads for the small
25 developers, correct?

1 **A.** That's right.

2 **Q.** Was that one proposal that you all considered over -- over
3 at the time that you were evaluating this?

4 **A.** Yes. That's one I sent to the team to try to keep an idea
5 going.

6 **Q.** And what other ideas were you sorting through during your
7 evaluation period?

8 **A.** We'd talked about a couple of different approaches. One
9 as a commission level based on what is we call an independent
10 developer. That's why it's called an "Indie Developer
11 Program."

12 Another idea was is there something we can do to
13 specifically target startup developers, bring new first-time
14 apps on the App Store.

15 So we had a number of different explorations.

16 **Q.** And why did Apple introduce this program when it did?

17 **A.** Well, I think there's a lot been going on in the last year
18 with the App Store and certainly a lot of input and -- and
19 commentary about the App Store's commission level. And
20 frankly, after four years of hearing about the teams trying to
21 come up with a model, I felt it was time to just get it done
22 and put it out there.

23 And honestly, these are all -- we can talk about all the
24 reasons, but number one important to me personally was the --
25 the pandemic. Over the last year, I think a lot of us are

1 concerned with small businesses in this country and how
2 they'll make it through and -- and whether they'll succeed,
3 and that was a personal motivation for finally getting this
4 done.

5 **Q.** And was this lawsuit a factor in the decision?

6 **A.** I would say it -- it helped me get it done, where for
7 years we didn't. And it certainly -- I would absolutely agree
8 that it -- it helped to get a program done that we wanted done
9 that was hard to get done. It isn't, I wouldn't say, why we
10 did it, but it certainly helped.

11 **Q.** And by the way, when you say it was hard to get done, what
12 sort of factors made it hard?

13 **A.** There were concerns about fraud, first of all, from -- if
14 we implemented it incorrectly, developers could do things with
15 changing accounts, switching apps between accounts in order to
16 manipulate the system just for a lower commission. Then ways
17 that wouldn't be good for them couldn't be good for users.

18 There were many concerns from our -- our -- our finance
19 and -- and -- and antifraud teams about money laundering
20 mechanisms that get -- get manipulated when -- when rates get
21 low. Things again I'm not expert in, but they are -- they
22 were adamant about as a big concern.

23 **Q.** And -- and what's your general understanding, if you -- if
24 you have one beyond what you just said, about where the risk
25 of money laundering was?

1 **A.** I proposed other commission levels even lower than -- than
2 what we've done. And our finance and antifraud team was
3 pretty adamant that as we start to get much below 15 percent,
4 the rate of increase of money laundering attempts goes up
5 dramatically. And so the -- the antifraud team was very
6 worried about a commission level anything lower than
7 15 percent for small businesses.

8 **Q.** And does the small business program look at the revenue on
9 a cumulative basis? In other words, for any individual
10 developer, if they have more than one account, does the
11 program look across those accounts in calculating the
12 \$1 million?

13 **A.** Yes, it does.

14 **Q.** And why does it do that?

15 **A.** Because, again, we certainly didn't want to artificially
16 create a scenario where developers just start to move apps
17 between accounts as they get to certain levels and -- and then
18 take it off the store, put it back on the store, move it in an
19 account just to try to hit a commission level that I don't
20 think that would be good for users or for -- for us.

21 **Q.** And what percentage of developers are eligible for the
22 small business program?

23 **A.** Over 90 percent of all developers.

24 **Q.** And did Apple notify developers about this program?

25 **A.** Yes, we did.

1 Q. What has it done to inform developers about this program?

2 A. We -- we did a great deal. We want to make sure that
3 every developer understood and knew the opportunity they had
4 and didn't miss out on it. So we proactively reached out
5 multiple times to developers this past December and also
6 provided news and information on our developer site, in our
7 developer app, everywhere we could.

8 Q. And have -- has outreach continued since last December?

9 A. Absolutely.

10 Q. And what percentage of eligible developers, or any
11 yardstick you wish to apply, my question really is how many
12 developers have enrolled?

13 A. We have tens of thousands in it at this point.

14 Q. And is that a -- a majority or a minority of those who are
15 eligible?

16 A. I think it's still a minority of those eligible.

17 Q. Have any of Apple's competitors responded to Apple's
18 announcement of a small business program?

19 A. Yes.

20 Q. And -- and can you describe that, please.

21 A. I believe Google announced that they would also have a
22 program for developers that also earned under a million
23 dollars per year in their accounts.

24 Q. We've heard discussion of search ads.

25 A. Yes.

1 Q. Can you describe what search ads are.

2 A. When a user goes to search on the App Store to find an
3 app, there's now an opportunity for developers to pay to place
4 an ad that shows up at the top of that search result if it's
5 appropriate for what the user's searching for, and so there's
6 one -- one spot for a search ad in search.

7 Q. And when you say if it's appropriate what that user is
8 searching for, what do you mean by that?

9 A. That -- we had a number of elements of the program that
10 were important to us to make sure it's a good user experience.
11 And probably one of the most important ones is what drives
12 whether an ad stays in a search result, is it something users
13 want and click on. So we look at what the user types in is
14 the -- what can be offered up or just things relative to that
15 search. And -- and it has to perform well or else it
16 shouldn't stay there.

17 Q. Are developers required to participate in search ads?

18 A. No.

19 Q. What was the original -- or what was the thinking or the
20 purpose in developing search ads as a program in the first
21 instance?

22 A. When the program was first proposed, we had heard from
23 developers that, as they were trying to drive up their app
24 discovery on app stores, they were buying marketing programs,
25 advertisements, on other places, Facebook, Google, and that it

1 was, especially for smaller developers, getting quite costly.

2 And so there was actually a request to Apple: Please give
3 us an opportunity to pay for something for marketing right in
4 the place where people are searching for apps.

5 So it came from developer input to try to give them more
6 efficient, more affordable way to try to drive demand of their
7 apps.

8 **Q.** And how are ads priced? In other words, how does the
9 pricing model work?

10 **A.** I don't know all the details myself. I do know there's an
11 auction that's -- that's important to it. And developers bid
12 on it. I know that it's not just the top bidder that wins
13 placement but the top two. That helps reduce costs by making
14 sure it's not somebody just spending the most always.

15 There are other elements to it. Again, I'm not the expert
16 on it.

17 **Q.** And do you have an understanding of why an auction process
18 was important to Apple?

19 **A.** To make it competitive pricing for developers to -- to be
20 able to afford it and -- and make it based on what they
21 thought they should pay for and what it was worth to them.

22 **Q.** You also mentioned that one ad would come up with each
23 search. Can you -- can you describe that in a little bit more
24 detail, please?

25 **A.** Yeah, there are a couple things about it.

1 One, we want to make sure -- this is only apps, right?
2 This isn't, you know, Coca Cola can't do a "drink Coke ad" in
3 the middle of a search for a game. These are only from
4 developers in the App Store.

5 What you see in the ad is the same result you would see if
6 you just saw them organically, that developer in the search ad
7 as well. So the content is also consistent with what's on the
8 store. And there's one ad that looks the same as the search
9 except it's identified clearly as an ad.

10 **Q.** And I believe we heard Mr. Sweeney complain about the
11 notion that sometimes when one searches for Fortnite, there
12 may be an ad that comes up in front of that. Do you recall
13 that?

14 **A.** Yes, I do.

15 **Q.** And I believe -- can you describe again how these
16 advertisements are identified when they come up?

17 **A.** Yes. They're -- they're identified by the developer who
18 placed them relative to the search the user did. And this
19 topic, there's a term in the industry for it called
20 "conquesting," the idea that can you place an ad on a search
21 term as it relates to some other product, competitor's
22 product.

23 And we talked a bit about whether that's something we want
24 to enable or not. And it was my opinion that this was
25 important for small developers, that if users are simply

1 always searching for the biggest developers' terms, if only
2 they can show up in a search ad, then the small developer
3 will -- will not get exposure and will lose out the
4 opportunity to try to get discovery on search.

5 So I do think it's a feature to help small developers
6 compete.

7 **Q.** Changing topics, does Apple require --

8 **THE COURT:** Can I ask a follow-up on that?

9 **MR. DOREN:** Please, of course, Your Honor.

10 **THE COURT:** So what is -- how is -- how do I know
11 that Apple's fairly competing in that same market for search?
12 I mean, does Apple just not compete?

13 **THE WITNESS:** That's right. We do not allow search
14 ads from Apple's products.

15 **THE COURT:** Okay.

16 Thank you. Go ahead.

17 **MR. DOREN:** Thank you, Your Honor.

18 **Q.** Mr. Schiller, does Apple require that digital content sold
19 on other platforms be sold for the same price as within the
20 App Store?

21 **A.** We do not.

22 **Q.** Are developers permitted to set their prices as they see
23 fit on -- on any platforms?

24 **A.** Yes, they are.

25 **Q.** And has Apple ever told Epic that it cannot charge less

1 for V-Bucks outside of the App Store?

2 **A.** No, we have not.

3 **Q.** And if I could direct your attention, please, to
4 Exhibit 2790. That's PX2790.

5 **MR. DOREN:** And, Your Honor, I believe these are
6 admitted. And these are the App Store Review Guidelines.

7 **THE COURT:** I think so too. Let me --
8 (Exhibit published.)

9 **THE WITNESS:** I see those.

10 **BY MR. DOREN:**

11 **Q.** Thank you.

12 **THE COURT:** Yes, they're in.

13 **MR. DOREN:** Thank you, Your Honor.

14 **Q.** Mr. Schiller, if you could please turn to page 2790.10.
15 (Reviewing document.)

16 **Q.** Are you there, sir?

17 **A.** Yes, I am.

18 **Q.** And if you look to the upper or the -- the top paragraph
19 entitled "3.1.1 In-App Purchase." Do you see that?

20 **A.** I do.

21 **Q.** And the last sentence of that paragraph says, "Apps and
22 their metadata may not include buttons, external links, or
23 other calls to action that direct consumers" -- "customers,"
24 rather, "to purchasing mechanisms other than in-app purchase."

25 Do you see that?

1 **A.** I do.

2 **Q.** And that was one of contractual provisions that Epic
3 breached with its hot fix; is that correct?

4 **A.** Yes.

5 **Q.** And if I could direct your attention, please, to 3.13
6 which is on the next page, page 11.

7 **A.** Yes, I see that.

8 **Q.** And this is entitled "Other Purchase Methods."

9 And here, the guideline states, "Apps in this section
10 cannot, either within the app or through communications sent
11 to points of contact obtained from account registration within
12 the app (like email or text), encourage users to use a
13 purchasing method other than in-app purchase."

14 And did I read that correctly?

15 **A.** You did.

16 **Q.** And do you recognize those as provisions in Apple's App
17 Review Guidelines?

18 **A.** Yes, I do.

19 **Q.** What -- what circumstances are these provisions designed
20 to address?

21 **A.** We -- we place these in here because, to use an analogy
22 that we used when we were writing them, in our mind if you
23 were going to a nice retail store, Nordstroms, to buy a pair
24 of jeans, a pair of Levis, you pick them up off the rack in
25 the store, you wouldn't expect to see a tag on it that says,

1 "Oh, you can go next door and buy this at Macy's." We didn't
2 think that was fair for the opportunity we're creating here
3 and -- and that they respect that our customers are buying
4 these on the App Store through the App Store. And that's --
5 was our intention and what we tried to do.

6 There are two of them, as you point out. The second one
7 is more specifically about these exceptions where you don't
8 have to use an app purchase and like the reader rule. And all
9 we were trying to do here and have been trying to do is to say
10 if the user is on the App Store and you've decided you can
11 acquire them elsewhere, that's great and you can communicate
12 with those customers.

13 But if you're getting a new -- a new customer here, you're
14 not popping up a text right in the middle of their setting up
15 their account saying, "Oh, go over there to pay for it."
16 Again, in Nordstroms, you wouldn't expect a pop-up saying
17 leave the store to go pay for it. And that was the intention.

18 **Q.** And we've heard testimony here I believe from -- from some
19 of Epic's experts around what email communications can be sent
20 from developers to the players of their games.

21 Do you remember that topic generally?

22 **A.** Yes.

23 **Q.** And can you please describe -- well, first of all, are
24 email communications from developers to the players of their
25 games permitted?

1 **A.** Yes.

2 **Q.** And can you describe under what circumstances or -- or for
3 what purpose 3.1.3 says that this -- apps in this section
4 cannot either within the app or through communications sent to
5 points of contact obtained from account registration within
6 the app or, paren, like email or text is referring to?

7 **A.** Again, we were just concerned with the situation where a
8 user -- a new user downloads an app, sets up a new account,
9 wants to pay for it, and the developer says, set up your
10 account, give me your email. And right away there's an email
11 in the box saying, "And here's how to go pay for it, not in
12 the App Store."

13 And I -- and I think the -- you know, the key idea here
14 was that they're targeting this individual user who really is
15 being acquired from the App Store.

16 **Q.** And other than that targeted kind of immediate post
17 purchase email that you just talked about, does Apple have any
18 problem with developers sending marketing emails or other
19 emails to the players of their apps?

20 **A.** No.

21 **Q.** Mr. Schiller, have you ever played Fortnite?

22 **A.** Absolutely. Quite a bit.

23 **Q.** And have you played it since last August, sir?

24 **A.** No, I have not.

25 **Q.** Well, when did you first download Fortnite?

1 **A.** It was in March of 2018.

2 **Q.** And was that during the -- the beta test, if you will, of
3 Fortnite on iOS?

4 **A.** Yeah. They had a phased rollout to sign users up as they
5 were ramping up their servers and support.

6 **Q.** And then it was fully up to speed in April, if I recall
7 the record. Do you recall that testimony?

8 **A.** That sounds -- sounds familiar.

9 **MR. DOREN:** And, Your Honor, in the front pocket of
10 the binder, you've been -- been handed is DX5567.

11 **THE COURT:** I see it.

12 **MR. DOREN:** Thank you, Your Honor.

13 (Exhibit published.)

14 **BY MR. DOREN:**

15 **Q.** And, Mr. Schiller, do you have Exhibit DX5567 with you?

16 **A.** I do.

17 **Q.** And can you please describe what this is?

18 **A.** This is one of the emails that I received from Epic upon
19 signing up for Fortnite on my iPhone.

20 **Q.** And March 14, 2018, was that essentially the day you did
21 sign up?

22 **A.** It -- it may have taken one or two days from sign-up to
23 getting this invitation to now play.

24 **Q.** And the email states, "Thanks for signing up. Hey, there,
25 thank you for signing up for the Fortnite invite event on

1 iOS."

2 And then it states, "Email invites will start rolling out
3 soon. The email invite will include a link to download the
4 game on the App Store. If you don't receive an invite right
5 away, don't worry, we'll be getting to you."

6 And then down at the bottom, it states, "On mobile,
7 Fortnite is the same 100 player game you know from
8 PlayStation 4, Xbox One, PC, and Mac. Same game play, same
9 map, same content, same weekly updates. Android will be
10 supported in the next few months."

11 And did I read that correctly?

12 **A.** Yes, you did.

13 **Q.** And does that disclosure, if you will, of other digital
14 game transaction platforms within this communication from Epic
15 to you, Mr. Schiller, did this breach any app review guideline
16 rule?

17 **A.** It did not.

18 **Q.** And why not, sir?

19 **A.** Because we don't have any rule against any marketing they
20 want to do to their users and their user base to encourage
21 them to play on all of their platforms.

22 **THE COURT:** Yeah, but what if this said, "If you
23 purchase on our" -- "if you go to Fortnite from your PC, you
24 can buy V-Bucks at a cheaper rate." Would that violate it?

25 **THE WITNESS:** Not if it's sent generally to the user

1 base. If it's literally, I, Phil Schiller, just signed up on
2 the iPhone, and they sent just me an email saying you can go
3 cheaper over there, that would be against the rule we wrote.

4 If it was to all of us in this room, like you can all go
5 get it, then broad communications we've never had any concern
6 with. It's just the targeting of the brand-new user that we
7 helped them get.

8 **THE COURT:** Okay. Proceed.

9 And did you want 5627 in evidence?

10 **MR. DOREN:** Yes, please, Your Honor. I'd move it in.

11 **THE COURT:** No objection?

12 **MS. FORREST:** No objection.

13 **THE COURT:** It's admitted.

14 (Defendant's Exhibit 5627 received in evidence)

15 **BY MR. DOREN:**

16 **Q.** And, Mr. Schiller, after this initial communication from
17 Epic, did you receive other emails from Epic?

18 **A.** Yes.

19 **Q.** For example, how many additional emails did you receive in
20 March 2018?

21 **A.** I looked back at it, and I got five in the first two
22 weeks.

23 **Q.** And have you continued to receive emails from Epic
24 regarding Fortnite ever since?

25 **A.** Yes.

1 Q. When -- when most recently did you receive such an email?

2 A. The last one I received was on April 29th.

3 Q. And, Mr. Schiller, if you could please look at
4 Exhibit DX5555, which is toward the very back of your binder.

5 A. (Reviewing document.)

6 (Exhibit published.)

7 THE WITNESS: Yes, I see that.

8 BY MR. DOREN:

9 Q. And, Mr. Schiller, is this the email that you see --
10 received from Epic games regarding Fortnite on April 29th,
11 2021?

12 A. Yes.

13 Q. And the subject line is "Go crazy, Neymar Junior is
14 unleashed"?

15 A. Yes.

16 Q. And we heard Mr. Weissinger testify about the new Neymar
17 scans, correct?

18 A. Yes.

19 Q. And among various information in this email, at the top of
20 the second page, there's a button there that says "get the
21 battle pass." Do you see that?

22 A. Yes, I do.

23 Q. And where would that button take you?

24 A. To Epic's website.

25 Q. And you could purchase the battle pass on their website

1 through that button?

2 **A.** Any -- yes. Anything they'd like me to do on the website,
3 I can do.

4 **Q.** And no matter what price they charge; is that right, sir?

5 **A.** That's right.

6 **Q.** So this email which came to you did invite you to go to
7 the Epic website to make purchases; is that right?

8 **A.** Yes, it did.

9 **Q.** And is it your understanding from having received these
10 emails over the last two years that these are general
11 marketing emails sent to the entire user base?

12 **A.** I don't know what percentages --

13 **MS. FORREST:** Objection, Your Honor.

14 **THE COURT:** Sustained.

15 **BY MR. DOREN:**

16 **Q.** And, Mr. Schiller, have you received other emails that
17 include similar invitations?

18 **A.** Yes.

19 **Q.** Mr. Schiller, we've discussed --

20 **THE COURT:** I'm sorry, Mr. Doren. One more
21 question --

22 **MR. DOREN:** Of course.

23 **THE COURT:** -- on this.

24 I thought I heard testimony that Apple doesn't allow
25 developers to have email addresses.

1 **THE WITNESS:** That's not correct.

2 **THE COURT:** So if you're a developer, then how do you
3 get your customers' email?

4 **THE WITNESS:** You just ask them. We've -- we've
5 always said you can get data from your users. We just think
6 you should ask them if they want to give it to you.

7 Now some apps, like Fortnite, require it because it's your
8 identity for your account, which is fine. But even if you
9 don't require it, if you want to ask, that's okay. You just
10 need permission.

11 **THE COURT:** Okay.

12 Proceed.

13 **BY MR. DOREN:**

14 **Q.** And, Mr. Schiller, just to make sure I understood that,
15 when someone opens a -- a Fortnite account, do they provide
16 their email address?

17 **A.** They do.

18 **Q.** And is that something you did when you opened your
19 account?

20 **A.** Yes.

21 **Q.** And -- and is that how you came to receive these emails?

22 **A.** Yes.

23 **Q.** Similarly, if someone purchases a game from a developer
24 in -- within the App Store, can that developer receive the
25 email address of that user?

1 **A.** Again, if they ask the user, yes.

2 **Q.** And if the user consents, can that developer then send
3 email communications directly to that person and other users
4 of the game?

5 **A.** Yes.

6 **MR. DOREN:** Your Honor, I'd also move DX5555 in,
7 please.

8 **MS. FORREST:** No objection.

9 **THE COURT:** Admitted.

10 (Defendant's Exhibit 5555 received in evidence)

11 **BY MR. DOREN:**

12 **Q.** Mr. Schiller, earlier today, we -- we touched upon app
13 review. Do you remember that topic generally?

14 **A.** Yes.

15 **Q.** Why doesn't Apple permit third parties to conduct their
16 own app review?

17 **A.** Well, first, we feel responsibility to our customers to
18 make the store safe and responsibility to make sure the apps
19 that are on the store follow the rules and all the rules apply
20 to all the developers the same way. And that's how we set it
21 up from the very first day.

22 And I -- I think we have a strong interest at Apple to
23 make sure that our users are protected and safe on the devices
24 that we create for them.

25 **Q.** And why does Apple care so much about app review?

1 **A.** It's a critical part of trying to make the store safe and
2 fair. It's the best way we could come up with, in addition to
3 the other systems and tools, we have to make it safe and fair.

4 **Q.** We've also heard the phrase in this trial, "store within a
5 store." Do you know that phrase?

6 **A.** Yes, I do.

7 **Q.** Why doesn't Apple permit stores within stores, within its
8 store, should I say?

9 **A.** There are -- there are a few reasons. It -- if -- if apps
10 are being delivered in -- from another developer through a
11 store, number one, those apps don't -- haven't taken out a
12 license with Apple, haven't committed to any of the terms that
13 we've set up to make our systems safe for us and our users.

14 Those apps don't have to follow any guidelines or rules
15 and therefore can create problems for us and the users.

16 And there would be no integration across our systems, our
17 store systems and our -- and our iPhone itself counts on
18 things that -- that happen through the App Store.

19 The store within a store, you wouldn't get parental
20 controls through your iPhone.

21 And there are many other examples.

22 **Q.** And is it important to Apple to have a consistent --
23 consistent information about each game presented to its users?

24 **A.** Yes. I -- I think one of the important features of the
25 App Store is the actual product page that we present where you

1 can see age rating, screenshots, reviews, privacy information,
2 compatibility information, on and on.

3 Q. And -- and we've heard testimony in this trial about a --
4 a game store called itch.io that's available on the Epic Games
5 Store. Do you recall that generally?

6 A. I did hear about that.

7 Q. And would having a store in Apple's store such as itch.io,
8 would you -- would that be acceptable to Apple?

9 A. No, for many of the reasons we've -- we've been
10 describing.

11 Q. Sir, we've also heard discussion about something called
12 the Executive Review Board. Are you familiar with that?

13 A. Yes, I am.

14 Q. And that's referred to internally as the ERB?

15 A. Yes, it is.

16 Q. What is the ERB?

17 A. We started the ERB when the App Store started. The -- our
18 thinking was to have a cross-functional team of executives at
19 Apple meet weekly and discuss all of the new policies, new
20 challenges we hit trying to run the App Store that the current
21 guidelines or terms may not properly address so that we can
22 deal with them quickly and provide developers a -- a
23 consistent equally fair set of rules across all developers.

24 So we've been meeting weekly since the App Store started.

25 Q. And you answered my next question. When was the ERB

1 formed?

2 **A.** Yeah, at the start of the App Store.

3 **Q.** And have you been a member of that board ever since?

4 **A.** Yes.

5 **Q.** And are you either the or one of the senior members of
6 that -- of the ERB?

7 **A.** Yes.

8 **Q.** And you mentioned when issues arise or challenges arise,
9 they come to the attention of the ERB. How does that happen?

10 **A.** The app review team collates all the -- both statistical
11 data as well as qualitative data of things that have occurred
12 during the week, and present them with the relevant issue and
13 guidelines they apply to, and we discuss each and every one
14 throughout that -- that board meeting.

15 **Q.** And are the app review guidelines ever modified?

16 **A.** Yes.

17 **Q.** Under what circumstances?

18 **A.** They are modified at least yearly, sometimes more than
19 once in a year when we run into situations that are new or
20 feedback from developers about something that isn't working,
21 or various situations.

22 **Q.** And would the addition, for example, of -- of
23 cross-platform play be an example of that in recent years?

24 **A.** Absolutely.

25 **Q.** And by the way, when were the app review guidelines first

1 published to developers?

2 **A.** The first time we published them externally was in 2010.

3 **Q.** And at the time, were you aware of any other game
4 distribution platforms publishing their guidelines to
5 developers?

6 **A.** No. If it existed on any store, we couldn't find it. We
7 looked to see for comparison any other guidelines stores had
8 published and -- and were not aware of any.

9 **Q.** And have you addressed within the ERB or otherwise an app
10 called Roblox?

11 **A.** Yes, that has come up.

12 **Q.** What is Roblox?

13 **THE COURT:** And before you move on, are they
14 publishing them now, their guidelines, other stores?

15 **THE WITNESS:** I believe some have, but I don't know
16 if it's pervasive.

17 **THE COURT:** Okay. Thank you.

18 **MR. DOREN:** Thank you, Your Honor.

19 **Q.** And, sir, have you addressed a -- an app called Roblox?

20 **A.** Yes.

21 **Q.** And what is Roblox?

22 **A.** In my opinion, it's a game.

23 **Q.** And why do you say that?

24 **A.** Well, it's a -- it's a new type of app. I think generally
25 in our industry we're all starting to see these kinds of

1 things. And it is made up of multiple games. It's not one
2 game. And the idea of who creates them and what they're for
3 is a new phenomenon in our industry, at least as far as I'm --
4 I'm aware. There may be a few other examples, but it's pretty
5 new stuff.

6 **Q.** And do each of the new games that are included in Roblox,
7 are they required to go through app review?

8 **A.** No.

9 **Q.** Why not?

10 **A.** Well, it gets to a concept that's again pretty new of
11 creator versus developer. And I apologize if this is a little
12 complicated, but the developer of the Roblox app is the Roblox
13 Corporation. They create the Roblox app. And they must
14 submit it for review and follow the guidelines, and the
15 content within it must follow the guidelines.

16 With Roblox itself allows a class of users, often called
17 creators, to create games within the Roblox app. And those
18 are added to Roblox and they're released as content within the
19 app while it's live.

20 **Q.** We saw during our -- our tour of Fortnite different games
21 in the creative mode. Did you see that?

22 **A.** I did.

23 **Q.** And I believe that Mr. Weissinger said that there were
24 some hundreds of thousands of these player-created islands.
25 Do you recall that generally?

1 **A.** Yes.

2 **Q.** Does Apple require that those creative mode islands be put
3 under app review?

4 **A.** No. As long as, again, the -- the app itself, Fortnite,
5 is reviewed and follows the rules, it can allow users within
6 it to create and change what they offer as long as it
7 continues to follow the overall sets of rules. And -- and the
8 developer in this case, Epic, would be responsible to make
9 sure that all their users are following the rules.

10 **Q.** And is this topic of this creator versus developer issue
11 that you've described, is that something that's kind of under
12 ongoing discussion in the ERB?

13 **A.** It is.

14 **Q.** Toward what end, sir?

15 **A.** Well, trying to understand how this -- this world of
16 gaming is evolving and how new modes are being created that
17 are different than -- than what have come before, and trying
18 to encourage and make sure we can do it in a way that's good
19 for developers, safe for users, fair to everybody, trying to
20 find the same -- the same philosophy we've tried to apply to
21 the store from the beginning.

22 **Q.** And, Mr. Schiller, I'd like to move to -- to another
23 topic. Are you familiar with a term within Apple called FEAR,
24 F-E-A-R?

25 **A.** Yes.

1 Q. And is that an acronym?

2 A. It is an acronym.

3 Q. And what does FEAR stand for, or what does the acronym
4 refer to?

5 A. It refers to a team that does fraud, engineering,
6 algorithms, and risk.

7 Q. And what are the responsibilities of the FEAR team?

8 A. Well, they work on our services to do a number of things.
9 They work on the -- the antifraud measures, for example, for
10 fraud, trying to find and protect users from fraudulent
11 accounts and developers from fraudulent user accounts.

12 They work on issues of piracy, trying to stop pirate apps
13 from being distributed, stealing from our developers.

14 They work to stop methods of spamming, spamming apps,
15 spamming reviews.

16 They work on the risk management of new features we're
17 working on, trying to look at the features and predict the --
18 the fraud that could happen with those features before we
19 implement them.

20 They work on a number of programs.

21 Q. And how do the responsibilities of the FEAR team compare,
22 contrast to the responsibilities of the app review team?

23 A. They're quite different.

24 As we've talked about app review, their job is every week
25 to individually review each app and communicate with every

1 developer that goes through that program with the goal of
2 trying to help developers get on the store. That's the
3 ultimate goal of the app review team.

4 The FEAR team works across the population of accounts and
5 transactions for the commerce engine and tries to identify and
6 predict trends of fraud and stop them and get in front of them
7 even sometimes before they occur, before any user has to deal
8 with that fraud.

9 **Q.** And is it fair to say then that the -- the app review team
10 tries to keep bad apps from getting on the App Store?

11 **A.** Yes, they do.

12 **Q.** And then the -- the FEAR team tries to address what's
13 gotten through?

14 **A.** A big part of the work does that. But they do more as
15 well.

16 **Q.** Thank you.

17 Part of the acronym is -- is engineering. What does that
18 refer to within the -- the FEAR context?

19 **A.** Well, they work with machine learning tools to engineer
20 methods of identifying fraudulent activities and -- and
21 predict where we're seeing rises.

22 A simple example. We -- we will see a rise of tens of
23 thousands of fraudulent accounts being created under
24 fraudulent developer accounts all of a sudden coming out of a
25 particular population or region of the world, and they see

1 those trends and try to get in front of where these activities
2 are happening using machine learning, engineering.

3 Q. And who heads up the FEAR team?

4 A. That's Eric Friedman.

5 Q. And we saw a number of Mr. Friedman's emails in the
6 opening statement. Do you recall that?

7 A. Yes, we did.

8 Q. If you could take a look, please, at Exhibit PX0250.

9 A. (Reviewing document.)

10 (Exhibit published.)

11 THE WITNESS: I see that.

12 BY MR. DOREN:

13 Q. And have you seen this email before, sir, other than in
14 the opening?

15 A. I've just seen it through this -- this case, yes.

16 Q. And directing your attention to the portion that was
17 quoted in the opening where Mr. Friedman says, "Pedraum, can
18 we talk about this? App review is bringing a plastic butter
19 knife to a gun fight. Investment will have to be made in
20 making that process more robust or they will keep getting
21 rolled."

22 First of all, what's the date of this email?

23 A. October 15th, 2013.

24 Q. And how long had the App Store been open by that time?

25 A. Five years.

1 Q. Okay. And how long has it been open since?

2 A. It's been another eight years.

3 Q. And what is the context of this discussion? In other
4 words, what topic was raised in this email that prompted that
5 response from Mr. Friedman?

6 MS. FORREST: Objection, Your Honor, foundation.

7 THE COURT: So this was in evidence -- well,
8 sustained.

9 MR. DOREN: Thank you, Your Honor.

10 Q. Mr. Schiller, let's look at the -- the first email in the
11 chain, if we can, please.

12 A. I see that.

13 Q. And you see the note to Mr. Friedman which says, "Recent
14 spike detections show that there are about seven fraud China
15 free apps showing on October 14, although it was pretty clean
16 on October 10"?

17 A. Yes.

18 MS. FORREST: Objection, Your Honor. I believe the
19 objection was sustained.

20 THE COURT: I thought he was laying foundation. This
21 is a business record, as I understood it. Is it not?

22 MS. FORREST: I'm sorry, Your Honor. I thought you
23 had sustained the objection when I had raised it. And --

24 THE COURT: So -- so the objection -- I did sustain
25 the foundation objection for that question. So I thought he

1 was laying foundation at this point.

2 **MS. FORREST:** Okay. It was not clear to me he was
3 laying foundation, Your Honor. If that's what he's going to
4 do, then --

5 **THE COURT:** And -- and, again, I -- because this is
6 an internal Apple document, I understand this to be a business
7 record.

8 **MS. FORREST:** Your Honor, it's -- I don't have any
9 doubt that it's a business record. It's really more whether
10 this witness can speak to this particular document since he's
11 not on it.

12 **THE COURT:** All right.

13 So lay some foundation.

14 **BY MR. DOREN:**

15 **Q.** Mr. Schiller, first of all, over the course of your career
16 in having ultimate responsibility or having some of the
17 ultimate responsibility for the App Store, do you often review
18 correspondence around issues that arise with different apps?

19 **A.** Yes.

20 **Q.** And do you review emails around different issues that come
21 up with app review?

22 **A.** Yes.

23 **Q.** And -- and in this instance, sir, in the email to Eric
24 Friedman at the beginning of this email chain, do you see a
25 report that recent spike detections show that there are about

1 seven fraud China free apps showing on October 14?

2 **A.** Yes.

3 **Q.** And in this email, sir, in the next email up, it says,
4 "FYI, Kristen put this together as a list of examples of how
5 developers in China are requesting five star ratings."

6 Do you see that?

7 **A.** Yes.

8 **Q.** Are you familiar with the issue of developers requesting
9 five star ratings?

10 **A.** Yes.

11 **Q.** Can you describe that issue, please?

12 **A.** Some developers will encourage their users through the
13 interface or sometimes even for trade for features to rate
14 their app with five stars, the highest rating, in order
15 improve their ratings on the App Store. And -- and so it can
16 be fraudulent to the extent that a developer is pushing users
17 to please rate your app.

18 **Q.** Yeah, I was going to ask, does Apple permit that?

19 **A.** It's -- we certainly have rules against incentivizing
20 or -- or pushing users to artificially rate your app.

21 **Q.** And then on the first page of the document in the note
22 from Mr. Friedman at the bottom, he's asking Phillip
23 Shoemaker -- who was Phillip Shoemaker in October 2013?

24 **A.** Mr. Shoemaker was head of app review.

25 **Q.** And who did Mr. Shoemaker report to at that time?

1 **A.** Me.

2 **Q.** And in the note to Phillip Shoemaker, Mr. Friedman says,
3 "Can you determine whether this behavior was evident during
4 the app review for the apps in the example apps?"

5 Correct?

6 **A.** That's right.

7 **Q.** And Mr. Shoemaker says if the apps request five star and
8 it is witnessed during review, we reject the app. Is that
9 correct?

10 **A.** Yes, it is.

11 **Q.** And -- and is that, in fact, what would happen in app
12 review in 2013?

13 **A.** Yes.

14 **Q.** Is that what would happen today in app review?

15 **A.** Yes.

16 **Q.** And then above that, Mr. Freeman sends a note to a
17 colleague in -- in the FEAR area, correct?

18 **A.** Yes.

19 **Q.** And it's in that context that he says, "App review is
20 bringing a plastic butter knife to a gun fight"; is that
21 correct?

22 **A.** Yes.

23 **Q.** So is -- is it correct, sir, that the -- the one issue
24 identified in this email are seven free apps in China that
25 were fraudulent on October 14?

1 **A.** Yes.

2 **Q.** Thank you, sir.

3 And sir, just quickly back to Roblox. Is all creator
4 content in Roblox using tools and content that were approved
5 through app review?

6 **A.** Yes.

7 **Q.** And so that's the kind of the Roblox architecture itself;
8 is that correct?

9 **A.** It is.

10 **Q.** Thank you, sir.

11 Compared to your expectations in 2008, how do you think
12 the App Store has done?

13 **A.** Very well.

14 **Q.** And has it exceeded your expectations?

15 **A.** Yes, it has.

16 **Q.** And if you could take a look, please, at Exhibit 4608.

17 **A.** (Reviewing document.)

18 (Exhibit published.)

19 **THE WITNESS:** Okay.

20 **BY MR. DOREN:**

21 **Q.** And in Exhibit 4608, can you tell us what this document
22 is, please?

23 **A.** This, again, is a transcript now from an Apple keynote
24 even in September of 2009.

25 **Q.** All right. And you're identified as one of the

1 presenters, correct?

2 **A.** I am.

3 **Q.** And you're third from the top in the -- in the key up at
4 the top?

5 **A.** Yes.

6 **Q.** And on that first page in the comments attributed to
7 Mr. Jobs, do you have that in front of you?

8 **A.** I do.

9 **Q.** And in the fifth paragraph, the third from the bottom,
10 Mr. Jobs says, "It's thrilling to report to you today that in
11 a letter over two years, we have sold 30 million iPhones."

12 Do you see that?

13 **A.** I do.

14 **Q.** Followed by cheers and applause, correct?

15 **A.** Yes.

16 **Q.** 30 million. And during the last year, one of the reasons
17 for that has been the remarkable App Store. The App Store is
18 just a little over a year old, and we now have over 75,000
19 apps.

20 Was that an accurate figure as of September 2009?

21 **A.** Yes, it was.

22 **Q.** And users have downloaded over 1.8 billion apps.

23 Is that number also accurate as of September 2009?

24 **A.** Yes, it was.

25 **MR. DOREN:** Your Honor, I'd move to enter DX4608 in

1 evidence.

2 **MS. FORREST:** No objection.

3 **THE COURT:** Admitted.

4 (Defendant's Exhibit 4608 received in evidence)

5 **BY MR. DOREN:**

6 **Q.** Sir, how many App Store customers are there worldwide
7 today?

8 **A.** Over a billion.

9 **Q.** And how many weekly visitors are there to the App Store?

10 **A.** Over 500 million.

11 **Q.** And how many apps are in the App Store today?

12 **A.** Approximately 2 million.

13 **Q.** And how many of those are games?

14 **A.** The last number I saw was approximately 280,000.

15 **Q.** About 75 percent of which, give or take, are free,
16 correct?

17 **A.** Correct, as we said earlier.

18 **Q.** And 17 percent of which use the freemium model, correct?

19 **A.** That's right.

20 **Q.** And are you familiar with an initiative called the App
21 Store Cleanup?

22 **A.** Yes.

23 **Q.** What is that?

24 **A.** Well, it's an idea I came up with a number of years ago
25 that after so many years, there were a growing number of apps

1 that had not been updated. They were getting old. They
2 didn't use the latest tools or operating systems or run on the
3 latest products.

4 And I asked our App Store team to come up with a
5 methodology to start finding those things and clean them up
6 out of the store.

7 **Q.** And do you recall when that was?

8 **A.** I'm thinking 2017, but I'm not a hundred percent positive.

9 **Q.** And what were the criteria that were applied to that
10 cleanup process?

11 **A.** Well, the ones we started with were, as I said,
12 developer -- apps that hadn't been updated for years that
13 didn't run properly on the latest hardware.

14 We also looked at if they had extremely low download
15 numbers, like less than five. And -- and there were other
16 criteria the team also came up with that were recommended, but
17 those were the key ones to me.

18 **Q.** And has -- was the App Store cleanup a one-time
19 initiative?

20 **A.** No. Once we did it the first time, the team worked to
21 create it as a repeatable process.

22 **Q.** And approximately how many apps have been removed through
23 this initiative?

24 **A.** I believe cumulatively it's been over 2 million.

25 **Q.** And are you familiar -- switching topics, sir. Are you

1 familiar with the term --

2 **THE COURT:** What's the time period again?

3 **THE WITNESS:** It's been a few years. I don't
4 remember which year we started. As I said, I was thinking it
5 was 2017, but I'd want to double-check that to be certain.

6 **THE COURT:** Thank you.

7 Sorry. Keep going.

8 **MR. DOREN:** Thank you, Your Honor.

9 **Q.** And are you familiar with the term "switching costs"?

10 **A.** Yes.

11 **Q.** And what are switching costs?

12 **A.** It's -- refers to the cost a user may need to incur if
13 they were to switch products from one company to another and
14 to try to get back to similar state of where they were.

15 **Q.** And we've heard testimony in this case about the switching
16 costs and moving away from iOS devices to devices with Android
17 operating systems. Do you recall that topic generally?

18 **A.** Yes.

19 **Q.** And since 2010, what's happened to switching costs?

20 **MS. FORREST:** Objection, Your Honor.

21 **THE COURT:** I'm not exactly sure what the objection
22 is.

23 **MS. FORREST:** Foundation.

24 **THE COURT:** I think it's -- well, it's also
25 overbroad.

1 **MR. DOREN:** I'll -- I'll try it again, Your Honor.

2 I'll admit it was a lazy question.

3 **Q.** Mr. Schiller, in your job and in your experience at Apple,
4 have you had occasion to evaluate what is involved in
5 switching from one device to another?

6 **A.** Yes, I have.

7 **Q.** And since 2010, has it become easier to switch devices?

8 **A.** In my opinion, in many ways it's gotten easier.

9 **Q.** And can you describe the basis for your opinion, sir?

10 **A.** Yes. Since 2010, there are a number of elements of using
11 a product like iPhone that we do in the cloud nowadays. Our
12 contacts, our photos. And that can help in switching your
13 devices.

14 There are more apps that are available on both iPhone and
15 other platforms. That can help with switching.

16 As we've discussed, there's a higher percentage, and in
17 total, more apps that are free, which helps because there's no
18 switching costs for a free app.

19 And notably that there are many services that are now
20 moved over to streaming services, like music, like video, that
21 are -- again, make switching easier and more affordable.

22 **Q.** And have OEM's, original equipment manufacturers,
23 developed any tools to assist those who wish to switch from
24 IOS to an Android operating system device?

25 **A.** Yes, they have.

1 Q. And just -- just generally speaking, how do -- first of
2 all, are you familiar in general with how those devices work?

3 A. Yes.

4 Q. And can you describe that, please.

5 A. The -- the company that makes the device, Apple, Samsung,
6 Google, and others, many of us create tools to help users
7 switch to our devices. So Apple will create tools to help
8 users switch from Android and ease that process to iOS. And
9 companies like Google and Samsung and others have made tools
10 to help users switch from iPhone to their devices.

11 Q. And has Apple attempted to create devices to help those
12 from Android switch to iOS?

13 A. Yes.

14 Q. And has Apple invested in making sure that the OEM devices
15 that help to transfer data from iOS to Android work better
16 than they otherwise would?

17 A. Well, again, primarily it's the -- it's the other maker
18 that wants to help the users to switch over to their device.
19 But I do think again the -- the change in how we all interact
20 with our devices and stores data in the cloud in general
21 across all of the providers has made it easier.

22 Q. Sir, if you could please look in your binder at
23 Exhibit 79.

24 A. (Reviewing document.)

25 I see that.

1 Q. And, sir, have you seen this document before?

2 (Document published.)

3 THE WITNESS: Yes.

4 BY MR. DOREN:

5 Q. And you were shown it in your deposition, correct?

6 A. I was.

7 Q. And did you originally see it back in 2013?

8 A. I believe so, yes.

9 Q. And what is Exhibit 79?

10 A. It's a report from an analyst at Goldman Sachs about
11 switching from iPhone to Android.

12 MR. DOREN: And, Your Honor, I believe that Exhibit
13 PX0079 is in evidence.

14 THE COURT: It is.

15 MR. DOREN: Thank you, Your Honor.

16 Q. And what does this analyst report on?

17 A. This analyst is reporting on their personal experience
18 switching from iPhone to Android.

19 Q. And if you could take a look --

20 MS. FORREST: Objection, Your Honor. If you could
21 lay the foundation for this document, this witness's knowledge
22 of the document.

23 THE COURT: Sustained.

24 BY MR. DOREN:

25 Q. Mr. Schiller, could you please look at Exhibit PX0080.

3 **THE WITNESS:** Yes.

5 **Q.** And do you see this as an email from you to a number of
6 your colleagues within Apple on June 20th, 2013?

8 Q. And the subject is "Goldman Sachs Switching Report." Do
9 you see that?

11 Q. And you state below that, "Here is an interesting report
12 on the cost and methodology to switch from iPhone to Android
13 (iTunes and iCloud figure pretty big in the ability and the
14 effort involved to switch)."

16 Q. And was Exhibit 79 the attachment that you included with
17 that email back in 2013?

19 **MS. FORREST:** Your Honor, my objection continues.

20 602. I can take it up on cross.

24 **MR. DOREN:** Thank you, Your Honor.

25 Q. Mr. Schiller, looking back at page 3 or 0079.3.

(Exhibit published.)

THE WITNESS: (Reviewing document.)

BY MR. DOREN:

Q. Do you have that page in front of you?

A. I do.

Q. And do you see the entry of the first bullet point which says explicit switching costs were \$79.85?

A. I see that.

Q. And the author says, "Excluding the costs to replace our library of movies and TV shows" --

MS. FORREST: Your Honor, excuse me. Could we have a sidebar? I have not asked for one before in this trial. But there is an issue that I think is legitimately raised right now.

THE COURT: Okay. So this entire document is in evidence.

MS. FORREST: Your Honor, this witness disclaimed any knowledge of this document or the email that -- during his deposition. And to have him testify about this document now is highly inappropriate. And there's no -- there's no foundation for it, and counsel knows that.

MR. DOREN: Well, Your Honor, I'm not asking for his recollection from 2013. I'm going to be asking him specific questions about whether the issues identified in this document continue to exist today. It doesn't require his historic

1 knowledge of this document, but simply comparing this
2 document -- simply -- I'm using it basically as a roadmap to
3 discuss switching issues. That's all.

4 **THE COURT:** Okay. Request denied.

5 Let's hear the question.

6 **BY MR. DOREN:**

7 **Q.** Mr. Schiller, in -- in the first bullet point on
8 page 0079.3, the statement is made, "Excluding the cost to
9 replace our library of movies and TV shows."

10 Do you see that statement?

11 **A.** I do.

12 **Q.** Now, back in 2013, what was the common practice or the
13 common way for someone that owned an iPhone to capture movies
14 and TV shows?

15 **A.** You would purchase them and download them to your device.

16 **Q.** So they would on -- on the hard drive, if you will, of
17 your phone?

18 **A.** On your memory storage, yes.

19 **Q.** Thank you. Thank you.

20 And what is the common practice today for the capture of
21 movies and TV shows on iOS devices?

22 **A.** The most common method today is to pay for a streaming
23 service like Netflix or Hulu.

24 **Q.** The next phrase in this description says, "Excluding" --
25 "after excluding the costs regarding movies and TV shows, as

1 well as the songs that failed to shed DRM through iTunes
2 match."

3 Do you know what DRM is, sir?

4 **A.** Digital rights management.

5 **Q.** And back in 2013, what would the issue have been in terms
6 of moving music that was subject to DRM?

7 **A.** Well, originally, with iTunes, all the music had a DRM on
8 it, a protective wrapper that locked it to you for your
9 purchase, and -- and that's how music was distributed.

10 Later on, we removed DRM and you could freely download and
11 then move music around between your devices and that went
12 away.

13 So older music still in your library back here in 2013
14 might have still had a DRM on it in that date. I think that
15 older music was before 2009 or 2010.

16 **Q.** And if today, you were to download an old song, Otis
17 Redding song, would that have DRM attached to it?

18 **A.** No.

19 **Q.** There's also a reference here to iTunes.

20 **THE COURT:** So the older product had DRM and it still
21 has DRM?

22 **THE WITNESS:** I'm sorry. No. The -- originally, the
23 music you would have bought in 2009 had DRM. Later on, if you
24 bought that same music later on, it no longer had DRM. So --
25 so for these users, this user in this report, it could have

1 been music in their library that they had previously
2 downloaded.

3 **THE COURT:** All right. Go ahead.

4 **BY MR. DOREN:**

5 **Q.** So just to be sure I understand, if someone still had a
6 song in their iTunes account that they had purchased in 2007,
7 if they had still had that song, then that song in their
8 iTunes account may still have DRM; is that right?

9 **A.** Yes. And not to make it more complicated, there was a
10 second way you would have music in your library back then.
11 You could put a CD in your computer and then rip it and then
12 iTunes would match it from what's in its library and say, oh,
13 you already bought it so you get to download and have that
14 too. And that was iTunes Match.

15 Again, this is old technology that nobody uses anymore,
16 but in this time in 2013, this author is referring to iTunes
17 Match and they would have had that.

18 **Q.** So if we're talking about again that Otis Redding song
19 that was purchased in 2007 with DRM, if someone else or even
20 that same person were to get that same song in 2010, would it
21 have had DRM?

22 **A.** No.

23 **Q.** So to the extent there's even a theoretical restriction
24 here, would it only be on music that was first downloaded
25 prior to 2009?

1 **A.** In theory. I remember, for example, in the -- around this
2 time, having a library of music myself on iTunes that had some
3 with DRM, some without, deleting it all, redownloading it and
4 now it was all clear of DRM. It was a cumbersome time, but
5 that's what you did.

6 **Q.** And there's a reference here to iTunes Match. Do you see
7 that?

8 **A.** Yes.

9 **Q.** First of all, back in 2013, was iTunes only on iOS
10 devices?

11 **A.** IOS and -- and Mac as well.

12 **Q.** Is that still the case?

13 **A.** No.

14 **Q.** Is iTunes now available on Android devices?

15 **A.** Yes.

16 **Q.** And so even if you had that 2007 song in your library and
17 it had DRM, you could still access it on an Android device; is
18 that right?

19 **A.** I believe so. But now we're dating my memory on some of
20 this.

21 **Q.** Sure. Thank you, sir.

22 And by the way, when did iTunes become available on
23 Android devices?

24 **A.** I'll sorry, I don't recall the year.

25 **Q.** Thank you.

1 And then the author goes on to refer to a \$25 or 24.99
2 expense for a subscription to iTunes Match. Do you see that?

3 **A.** Yes.

4 **Q.** If you change from an iOS device to an Android device
5 today, do you need a -- a tool or a subscription to something
6 called iTunes Match?

7 **A.** No, you do not.

8 **Q.** And is that because iTunes is now available on Android?

9 **A.** Both that and many users have switched over to the Apple
10 music streaming model where none of this applies anymore.

11 **Q.** And then the author goes on to say, "4.99 for the paid
12 version of a music management app."

13 Do you see that?

14 **A.** Yes.

15 **Q.** And again, would that be necessary today?

16 **A.** No.

17 **Q.** And then finally \$49.87 for paid replica apps. Do you see
18 that?

19 **A.** I do.

20 **Q.** And in 2013, was the paid download still the prevalent
21 model?

22 **A.** Certainly much more so than today.

23 **Q.** And today, is the prevalence of apps, the same apps, if
24 you will, between iOS and Android higher than it was in 2013?

25 **A.** Yes, it has increased.

1 Q. And then down at the -- at the last bullet point on the
2 page, the author writes, "The 79.85 figure represents what we
3 would define as explicit switching costs while the raw time
4 and pain in the neck factor of the switch would represent
5 incremental implicit switching costs."

6 Do you see that?

7 A. I do.

8 Q. And is the pain in the neck factor less than it was in
9 2013, sir?

10 MS. FORREST: Objection, Your Honor.

11 THE COURT: Sustained.

12 BY MR. DOREN:

13 Q. And, sir, is it easier now in terms of the physical steps
14 to transfer data, are those steps easier now than they were in
15 2013?

16 A. Certainly now, as we've discussed, many OEM's have made
17 tools to make it easier than it was ever in the past. And
18 certainly now we have -- I call it storage options for many --
19 for many vendors to make that as well much easier than it was
20 in the past.

21 Q. Thank you, sir.

22 And then back on page 1 of Exhibit 79.

23 (Exhibit published.)

24 BY MR. DOREN:

25 Q. Under implications, do you see that?

1 **A.** I do.

2 **Q.** The author writes, "Overall, we believe Apple's installed
3 base loyalty clearly differentiates it from traditional IT
4 hardware companies, though the company's ability to attract
5 new consumers with new products remains the core of the
6 long-term story."

7 Now do you agree with that statement?

8 **MS. FORREST:** Objection, Your Honor. Foundation.
9 Not being used as a roadmap.

10 **THE COURT:** Well, he can say whether he agrees or
11 doesn't agree. It -- well, change your form.

12 **MR. DOREN:** Sure, Your Honor.

13 **Q.** Mr. Schiller, do you agree that Apple's ability to attract
14 new customers with new products remains the core of the
15 long-term story?

16 **A.** Yes, I do.

17 **Q.** And do you believe, sir, that Apple's installed base
18 loyalty differentiates it from the competition?

19 **A.** I think so, yes.

20 **Q.** And do you believe, sir, that Apple's commitment to
21 privacy and security is part of that?

22 **A.** Absolutely.

23 **Q.** Sir, I'd like to show you what has been marked as
24 Exhibit PX892. It's in your binder.

25 **A.** (Reviewing document.)

(Exhibit published.)

THE WITNESS: I see that.

BY MR. DOREN:

Q. And can you identify for us what Exhibit PX0892 is?

A. It's an email from Steve Jobs to the ET at Apple.

MR. DOREN: And, Your Honor, this document is in evidence, as I have it.

Your Honor, this is another document that was admitted on May 12th by court order.

THE COURT: It is admitted.

MR. DOREN: Thank you, Your Honor.

THE COURT: It's just the way this document is formatted, it's hard to find.

MR. DOREN: Absolutely right. Thank you, Your Honor.

Q. Mr. Schiller, this is an email from Steve Jobs to the -- to the ET; is that correct?

A. Yes.

Q. And can you remind us what the ET is?

A. The executive team.

Q. So is this an email you would have received back in 2010?

A. Yes.

Q. And the subject is "Top 100-A."

What is that a reference to?

A. This is a draft agenda that Steve is putting together and sharing with us for input.

1 Q. And item 1 is 2011 strategy. In October 24, 2010, what
2 was that a reference to?

3 A. The top 100 meeting traditionally covers each year the
4 next year coming up, the things we're doing and working on.

5 Q. And if you go down four hash marks, if you will, to 2011,
6 colon. Do you see that?

7 A. Yes.

8 Q. And it states, "2011: A holy war with Google."

9 Is that right?

10 A. Yes.

11 Q. And part of the agenda was to discuss all the ways we will
12 compete with them?

13 A. Yes.

14 Q. And if you go down one more, it says, "2011, year of the
15 cloud."

16 Do you see that?

17 A. Yes.

18 Q. And what is that a reference to?

19 A. It's a reference to the new ways that companies like
20 Google and others are starting to use cloud services to
21 support their customers.

22 Q. And Mr. Jobs writes, "We invented digital hub concept."

23 What is that?

24 A. That was a -- a concept we rolled out in either 1997 or
25 '98 where your personal computer, your Mac, your iMac, was the

1 center of your digital life. You would plug in your cell
2 phone back then, your digital camera, your digital video
3 camcorder, and now have all of that previously physical media
4 on your computer to manipulate and use and share. It was a
5 very creative concept about how our lives are moving digital.

6 **Q.** And that was back in the late '90's, you say?

7 **A.** Yes.

8 **Q.** And then down further in that same set, Mr. Jobs writes,
9 "Apple is in danger of hanging on to old paradigm too long
10 (innovator's dilemma)."

11 Do you see that?

12 **A.** Yes.

13 **Q.** And what did you understand that to be a reference to?

14 **A.** We started to make it such that you would synch
15 information between your devices. So let's say you had your
16 calendar on your Mac, and you wanted to put it on your iPhone
17 or your iPad, you would use syncing technology to do that.

18 The problem is if you had more than two devices, the
19 accuracy of the sync with multiple devices can get very
20 confused very quickly and you don't know what's the truth
21 anymore, what's the right versions.

22 And so he saw that we were in danger of hanging on to this
23 old digital hub model where everything went back into your
24 computer wouldn't be the way in the future if you wanted to
25 manage that information.

1 Q. And Mr. Jobs then says, "Google and Microsoft are further
2 along on the technology but haven't quite figured it out yet."

3 What's that's a reference to?

4 A. Again, to solving this problem of how do you synchronize
5 your data across more than one device to make sure you always
6 have the truthful, correct versions.

7 Q. And he then finishes this section with, "Tie all of our
8 products together so we further lock customers into our
9 ecosystem."

10 And what's that -- what does that mean to you?

11 A. So at this point, again, we're talking about your
12 contacts, your calendar, and your email being able to be
13 properly represented on all your devices, and that if we could
14 create a way to do that for users in the next year, that we
15 would have a better platform that they want to stay with.

16 Q. And when the term "lock" -- or "further lock customers
17 into our ecosystem," what did you understand this to mean?

18 A. Simply that if customers like these -- the way these
19 products work, they're going to want to stay with us.

20 Q. And going down further under number 3 for iPhone, do you
21 see that?

22 A. Yes.

23 Q. And there's the first entry, 2011 Strategy, and it says,
24 "Plus iPhone 4 with better antenna, processor, camera, and
25 software to stay ahead of competitors until mid 2012."

1 Correct?

2 **A.** Yes.

3 **Q.** And what's that a reference to?

4 **A.** Well, Steve was suggesting at this part of the draft
5 agenda that two of my team, Joz and Bob Borchers, would
6 present the -- what the next features should be for iPhone to
7 follow on iPhone 4 with these list of features that he's just
8 enumerated.

9 **Q.** And the next reference relates to have LTE version in
10 mid 2012. What's that a reference to?

11 **A.** That's 4G LTE networking.

12 **Q.** Thank you, sir.

13 And if you could look, please, at page 20892.2.

14 **A.** Yes.

15 **Q.** And item 6 there is Mobile Me. Do you see that?

16 **A.** Yes.

17 **Q.** Now, do you know what Mobile Me was?

18 **A.** Yes. This was the service to do what we were just talking
19 about, to start to create a cloud-based infrastructure for our
20 customers to be able to have their data in the cloud and have
21 it work properly across all your devices.

22 **Q.** And the first hash mark says, "Strategy, catch up to
23 Google cloud services and leapfrog them."

24 Do you see that?

25 **A.** Yes.

1 Q. And under that, it says, "Android deeply integrates Google
2 cloud services way ahead of Apple and cloud services for
3 contacts, calendars, mail."

4 What does that mean?

5 A. Here Steve is just pointing out that he believes that
6 Android has started this ahead of Apple and -- and is starting
7 to build these features into their operating system.

8 Q. And then again under 2011, under that same section,
9 Mr. Jobs writes, "Apple's year of the cloud, tie all of our
10 products together, make Apple ecosystem even more sticky."

11 Do you know what that's referring to?

12 A. Yes. So in this meeting, Steve was rallying everyone at
13 the top 100 to support this Mobile Me effort because it's
14 cross-functional to make these products work together and to
15 do exactly -- I mean it sounds simple today, right, the idea
16 that your contacts, calendar, and mail actually works across
17 your computer and phone. We're all used to this. But at this
18 time in 2011, we didn't have that, and we were behind in
19 offering that. And if we did deliver it well, our customers
20 would love our products.

21 Q. Thank you, sir.

22 Mr. Schiller, are you -- are you a gamer?

23 A. I think so.

24 Q. And which digital transaction platforms do you use for
25 games?

1 **A.** I've got an XBox, a PlayStation, a Nintendo Switch, of
2 course my Macs, my iPhone, my iPad, an Apple TV, and also a
3 dedicated VR auto racing simulator rig.

4 **Q.** I think you're a gamer, sir.

5 And you discussed earlier Apple's views of each of those
6 different platforms and other digital platforms as competition
7 for game transactions; is that correct?

8 **A.** I think so, yes.

9 **Q.** And are you familiar with Steam?

10 **A.** Yes.

11 **Q.** And we've heard some testimony about Steam. You
12 understand that to be a PC game store?

13 **A.** PC and Mac, yes.

14 **Q.** Thank you. Thank you, sir.

15 And does the App Store compete with Steam?

16 **A.** It does.

17 **Q.** In what ways?

18 **A.** That users can find games to download and play and get
19 them from Steam or get them from our App Store, and it
20 competes for that purchase from a user.

21 **Q.** And we've heard some testimony about adjustments made to
22 Steam's commission structure. Do you recall that generally?

23 **A.** Yes.

24 **Q.** And as the -- the person with some of the ultimate
25 responsibility for the App Store, how have you viewed that as

1 a -- in terms of your competitor strategy?

2 **A.** I think it's important for us to -- to try to understand
3 what each platform is doing and consider it from our
4 developers' perspective, as well as the user. And I think
5 it's important for us to understand Steam and what they're
6 doing. And it relates to things we may or may not do in the
7 future with -- with the App Store, always.

8 **Q.** And we've heard testimony about the Microsoft Windows
9 Store in this trial. Do you recall that generally?

10 **A.** Yes.

11 **Q.** And does the App Store compete with Microsoft Windows
12 Store?

13 **A.** Sure, yes.

14 **Q.** And what does -- in the gaming space, what does the
15 Microsoft Windows Store tell?

16 **A.** It sells some, not quite as much as their Xbox game store
17 does, but it does sell some as well for the PC.

18 **Q.** Is it a less -- strike that.

19 Is it a smaller game -- digital game transaction platform
20 than the consoles?

21 **MS. FORREST:** Objection, Your Honor.

22 **THE COURT:** He can testify based on his personal
23 experience.

24 **THE WITNESS:** From my experience, it is -- it is a
25 smaller game marketplace than the Xbox is.

1 **BY MR. DOREN:**

2 **Q.** And we've heard testimony here that Microsoft Windows
3 Store has reduced its commission level to 12 percent. You've
4 heard that testimony?

5 **A.** Yes, I have.

6 **Q.** And as -- as the person with ultimate responsibility for
7 the App Store and someone who keeps track of the competition,
8 were you aware of that announcement when it came out?

9 **A.** I read it, as everyone did, in the press.

10 **Q.** You wouldn't talk to a competitor directly about pricing,
11 correct?

12 **A.** Never.

13 **Q.** And when was that announcement made by Microsoft?

14 **A.** April 29th.

15 **Q.** Of this year?

16 **A.** Yes.

17 **Q.** So the Thursday before this trial began?

18 **A.** Yes.

19 **Q.** And has that reduced commission gone into effect yet?

20 **A.** According to their announcement, I believe it takes effect
21 on August 1st.

22 **Q.** So it hasn't gone into effect yet, true?

23 **A.** Not -- not from what I've read.

24 **Q.** And what area within Microsoft or what people within
25 Microsoft made that public announcement?

1 **MS. FORREST:** Objection.

2 **MR. DOREN:** I'll rephrase, Your Honor.

3 **THE COURT:** Okay.

4 **BY MR. DOREN:**

5 **Q.** From the press releases you looked at, to whom was the
6 announcement attributed?

7 **A.** I read in every press release -- the press release from
8 Microsoft and all the announcement interviews, it was given by
9 the head of the XBox Games Store.

10 **Q.** And was there any announcement that you have seen about
11 reduced commissions on the XBox?

12 **A.** No. In fact, I believe in their announcement they said
13 they weren't reducing commission on the XBox Store.

14 **Q.** Now, does Apple bar its competitors from submitting apps
15 to the App Store?

16 **A.** We do not.

17 **Q.** And can you provide us some examples of the instances in
18 which Apple's competitors have placed apps on Apple's App
19 Store?

20 **A.** Absolutely. It's something we've encouraged. We have
21 apps on our App Store from Microsoft, Google, Amazon, Sony,
22 Nintendo, and pretty much every company we've talked about in
23 this trial.

24 **Q.** Now, we've heard testimony about Steam Link, correct?

25 **A.** Yes.

1 Q. And can you remind us what Steam Link is?

2 A. Steam Link is an app you can run on your iPhone or iPad
3 and connect to the PC you may have that runs games with Steam.
4 And it allows you to make purchases through that store and to
5 stream games directly from your PC to your iPhone or iPad.

6 Q. And does Apple take a commission on any sales or purchases
7 made through that app from Steam?

8 A. We do not.

9 Q. Why not?

10 A. We've considered any digital transaction where the user
11 doesn't consume it on their device. It's meant to be on
12 another platform, not part again of where we're adding value,
13 and so we take no part in that transaction.

14 Q. And are you familiar with an app called Xbox Remote Play?

15 A. Yes.

16 Q. What is Xbox Remote Play?

17 A. Similarly, it lets you play games remotely from your Xbox
18 through your -- your iPhone device and have a streaming
19 experience.

20 Q. And can purchases be made through the Xbox on that app?

21 A. I believe so, yes.

22 Q. And does Apple charge or take a commission on any of those
23 transactions?

24 A. No, we do not.

25 Q. And is that for the same reason that it does not on Steam

1 Link?

2 **A.** Yes.

3 **Q.** And are you familiar with an app called PlayStation Remote
4 Play?

5 **A.** Yes.

6 **Q.** And what is PlayStation Remote Play?

7 **A.** Similar. It can let you play games from your PlayStation
8 and stream it in a view on your iPhone or iPad.

9 **Q.** Now, sir, we heard testimony from the Microsoft witness
10 about its discussions with Apple on putting its streaming
11 services in the App Store. Do you recall that generally?

12 **A.** Yes, I do.

13 **Q.** And did you participate in discussions with Microsoft on
14 that topic?

15 **A.** I did.

16 **Q.** And can you describe kind of the arc of those discussions
17 from your perspective?

18 **A.** Well, as was stated, Microsoft has been developing their
19 xCloud game streaming service and would like to bring it to
20 different platforms including iPhone and iPad. And in our
21 discussions, I expressed very clearly that we would love to
22 have them stream games to our users on our platform as long as
23 it follows the rules that other developers have to follow.
24 Whether those games are streaming or local really doesn't
25 matter to the ultimate solution for the user as far as the

1 store is concerned.

2 Q. And I believe you heard the Microsoft witness testify that
3 Apple required each game to be separately submitted. Do you
4 recall that?

5 A. Yes. That's true.

6 Q. And was that accurate?

7 A. Yes.

8 Q. And why did Apple require that?

9 A. Because when the user -- when our users go into the App
10 Store to get a game, they're going to look for a game, they're
11 going to type in a search to find a game, they're going to
12 want to see the product page. What is this game? What's the
13 age rating? What are its features? And as a store, we want
14 to provide that information to our users.

15 So we thought the right thing for our customers is that
16 even if the games are streaming from Microsoft's cloud, the
17 user should still be able to find them, they should be able to
18 see them, they should see what its privacy policy is, they
19 should be able to run parental controls on it if they want.
20 So all the things you expect the store to do, it should be
21 able to do for the users who want those games.

22 THE COURT: Okay. So how does this differ now from
23 Netflix? I don't pay -- if I pay Netflix the subscription, I
24 can watch their content and I don't pay for each download.

25 THE WITNESS: In two ways. First of all, Netflix,

1 all the content is -- that the app itself, what it does
2 technically, is reviewed and approved by us. And then they
3 just flow more of the same kind of content, TV shows, TV
4 shows, TV shows through that. So we're not reviewing the
5 content, we're reviewing the features of the app.

6 The Xbox Cloud, each game is a separate app. And it is
7 something that requires review. They do much more than just
8 play video. These are interactive games. So that's -- that's
9 one reason.

10 The second is the App Store is not a movie store. You
11 can't search for a movie in the App Store. If you type in
12 your favorite movie, you're not going to get a result in the
13 App Store. It isn't about movies. It's an apps and games
14 store. And so when you bring in games in a different way, it
15 now no longer works as designed as a game store.

16 So I do think there's a difference there.

17 **THE COURT:** All right. Proceed.

18 **BY MR. DOREN:**

19 **Q.** Mr. Schiller, the Court included in its question a
20 reference to having to pay each time a streaming game would be
21 downloaded that -- that would be an individual Microsoft
22 streaming game on the App Store. Is that how it would work?

23 **A.** No.

24 **Q.** How would it work?

25 **A.** Microsoft or any game developer can build a service where

1 if they want to have subscription and then publish each of
2 these games on the store, that one subscription can cover all
3 those individual games, and that's allowed in the guidelines
4 of the App Store.

5 Q. So there wouldn't be a need to pay on a game-by-game
6 basis?

7 A. No, there would not.

8 Q. And so if -- if Microsoft were to submit, for example, to
9 begin with, its ten most popular games, its ten most popular
10 streaming games, and submit those individually for app review,
11 would that be acceptable to Apple?

12 A. Yes.

13 Q. And it could continue to submit other games on a going
14 forward basis?

15 A. Yes.

16 Q. And would all of those be subject to the same single
17 subscriptions?

18 A. If that's how they want to set it up, yes.

19 Q. That would be up to Microsoft?

20 A. That's right.

21 Q. Now --

22 THE COURT: And there wouldn't be a separate app?
23 They could go to one app and access all of that?

24 THE WITNESS: You would see on your home screen or
25 your phone each of the games that you chose to play. They

1 would show up individually. The other thing --

2 **THE COURT:** So you couldn't go to one app, the
3 Microsoft gaming stream app, and in that app have the ten
4 games.

5 **THE WITNESS:** Correct.

6 What they can create, similar but not -- not all the way
7 that, is what we call a catalog app. They could create a
8 Microsoft xCloud app that showed all the games. It's just
9 when you want to play one, you would click on it in the
10 Microsoft xCloud app, and it would open up its product page in
11 the App Store so you could see all the correct product
12 information when you click to play it.

13 **THE COURT:** All right. Proceed.

14 **MR. DOREN:** Thank you, Your Honor.

15 **Q.** Separate and apart from the question of native apps for
16 the Microsoft streaming service, did Apple provide support for
17 Microsoft -- other support regarding its streaming service?

18 **A.** We did.

19 **Q.** And what was the nature of that support?

20 **A.** Well, it was a suggestion we made to them, which is, they
21 can go the route of submitting the games into the App Store,
22 and we think that's a good model for users. Or they could
23 reach us directly through Safari and do whatever they want on
24 Safari the same as on the open web and we would encourage them
25 that if they wanted to go that route, that we would help them

1 with that as well.

2 Q. And changing topics, sir, to Apple's investment in -- in
3 its ecosystem. What did Apple spend on research and
4 development in 2005?

5 A. I believe that was about \$500 million.

6 Q. And how much did Apple spend on research and development
7 in 2020, last year?

8 A. Approximately \$18 billion.

9 Q. And during that 15-year period, between 2005 and 2020,
10 approximately how much has Apple spent on R&D?

11 A. I believe the cumulative total is around a hundred billion
12 dollars.

13 Q. And has Apple continued to invest in the iPhone?

14 A. Yes.

15 Q. And has Apple continued to invest in tools for developers?

16 A. Yes.

17 Q. And have those investments impacted the App Store?

18 A. Yes.

19 Q. And has Apple continued to invest in the App Store itself?

20 A. Yes.

21 Q. With the Court's permission, Mr. Schiller, I'd like to
22 show you a demonstrative.

23 (Demonstrative published.)

24 THE WITNESS: All right.

25

1 **BY MR. DOREN:**

2 **Q.** And this demonstrative shows two sets of information, one
3 relating to hardware and one relating to cellular.

4 Do you see that?

5 **A.** Yes.

6 **Q.** And the first entry under hardware is dated 2007 and
7 refers to something called the accelerometer. And we heard
8 Dr. Athey mention the accelerometer on several occasions, but
9 I don't think that ever got defined.

10 So could you please tell us what an accelerometer is?

11 **A.** Sure. It's a sensor, in this case an iPhone that measures
12 motion as a variable of acceleration. And it's general
13 information that's really useful to a number of features.

14 **Q.** And is that the feature that when I turn my phone
15 sideways, it goes into landscape mode?

16 **A.** Exactly. It sounds simple, but it takes a bunch of work
17 to make it do that seamlessly as you tilt your iPhone back and
18 forth.

19 **Q.** And was that part of the original iPhone?

20 **A.** Yes.

21 **Q.** And is that relevant to game developers?

22 **A.** Sure. I think as game develop -- users like to tilt their
23 iPhone into landscape mode and play games with two hands, it's
24 really convenient.

25 **Q.** And then the next item on the demonstrative is from 2010,

1 and it's a reference to a gyroscope. Do you see that?

2 **A.** Yes.

3 **Q.** And did Apple, in fact, launch a gyroscope feature in
4 2010?

5 **A.** We did.

6 **Q.** And what is that?

7 **A.** That's another sensor that detects motion along a
8 three-dimensional axis so that you can rotate and turn your
9 iPhone around, and we send that information to software.

10 **Q.** And is that feature relevant to game developers?

11 **A.** Sure.

12 **Q.** How so?

13 **A.** I've seen examples, for example, a racing game where, as
14 you tilt your iPhone along the axis left and right, you could
15 be steering, lean it forward to accelerate, or lean it back
16 and brake. And that's just one example. Developers are so
17 creative on what to do with these sensors.

18 **Q.** And the next item also from 2010 is called retina display.
19 Do you see that?

20 **A.** Yes.

21 **Q.** And did Apple include a feature called retina display in
22 2010?

23 **A.** We did.

24 **Q.** And what is that?

25 **A.** It was a pretty important moment in the display technology

1 of iPhone. The idea of the retina display was as we provided
2 more density of information, more pixel density, the pixels
3 got so close together that in a normal distance of about
4 6 inches from your face, your eye cannot detect the individual
5 pixels. So photos look more natural, fonts on text look
6 really smooth. It was a big breakthrough.

7 **Q.** And was that relevant to game developers?

8 **A.** Sure. Great graphics are certainly a hallmark of so many
9 wonderful games.

10 **Q.** And has the retina display been static since 2010?

11 **A.** Not at all.

12 **Q.** How has it evolved?

13 **A.** It's evolved in many ways. It's grown larger through the
14 years. We've moved to newer generation technology, moving
15 from LCD to OLED display technology, which gives blacker
16 blacks, higher contrast ratios.

17 We've even used flexible displays to now fold the display
18 drivers behind the edges so you can have your display right up
19 to the edge of the iPhone.

20 **Q.** And when did the change from LED to OLED occur?

21 **A.** With iPhone 10.

22 **Q.** Thank you.

23 The next hardware feature that we've referenced here is
24 from 2014, and it's called the Taptic Engine. Did Apple
25 release a feature called Taptic Engine in 2014?

1 **A.** We did.

2 **Q.** And what is that?

3 **A.** It's one of these really small details, but they're --
4 it's really helpful. The iPhone has had a -- from the
5 beginning a switch you flipped when you want to go into
6 silent. When it's silent, it vibrates.

7 And what it used to do was it had a mechanical actuator
8 that vibrated. Took a lot of space. It was energy
9 inefficient and wasn't that accurate a feeling compared to
10 what we did with this, which is the Taptic Engine uses
11 advanced haptic technology to give a much more precise,
12 accurate feeling to how things vibrate.

13 **Q.** And is Taptic Engine relevant to game developers?

14 **A.** Sure. It supports input that we call haptics, the ability
15 to feel like, when you're pressing on something, this force
16 feedback or vibration to the user interface.

17 **Q.** And is that a feature that's been included in -- in games
18 since?

19 **A.** Yes. For those developers who take advantage of it.

20 **Q.** And in -- in 2016, the graphic references stereo speakers.
21 Were stereo speakers incorporated in the iPhone in 2016?

22 **A.** It was.

23 **Q.** And can you describe for the Court generally what's been
24 done with the audio on iPhones then and since?

25 **A.** Yes. Obviously speakers in general, in order to deliver

1 quality and volume, take air. They move air. So you need
2 more space. But that's not what you want to give up in a
3 small hand-held device, is a lot of space to make sound
4 better. So our engineers have created newer generation
5 speakers that are very small, very efficient, and so much so
6 that we could put two of them in and have stereo sound in
7 iPhone.

8 **Q.** And is that improvement relevant to game developers?

9 **A.** Oh, yes. I think great soundtracks are a hallmark of so
10 many wonderful games, and they take advantage of the speaker
11 system in iPhone.

12 **Q.** And in our tour of Fortnite, we heard some pretty good
13 audio, correct?

14 **A.** I believe so.

15 **Q.** And next from 2017 is something called Neural Engine.
16 First of all, did Apple introduce a feature called Neural
17 Engine in 2017?

18 **A.** We did.

19 **Q.** And -- and what is that?

20 **A.** It's part of our Apple chip inside the iPhone. It's a
21 dedicated processing unit called the Neural Engine, and it's
22 optimized for this new generation of software called machine
23 learning, a branch of AI that allows developers to do some
24 incredibly predictive advanced techniques with machine
25 learning on a very fast, efficient Neural Engine.

1 And this Neural Engine is separate from the CPU, the
2 central brain of the chip, and the GPU, the graphics. So it
3 leaves the rest of your chip free to do other things in your
4 app while the Neural Engine processes the machine learning
5 libraries.

6 **Q.** And what is the relevant -- or is that relevant to game
7 development?

8 **A.** Oh, I think it impacts many software applications
9 including game developers who want to start to take advantage
10 of this new machine learning technology.

11 **Q.** And the last item under hardware is something called
12 LiDAR. What is LiDAR?

13 **A.** It's light detecting and ranging. So it's a laser
14 technology that allows a sensor called a scanner to scan the
15 space you're in and create a 3D depth map of your furniture,
16 your walls, so that now for AR applications, you can actually
17 place things, computer-generated content, within the scene of
18 your space very fast, very efficiently.

19 **Q.** And when was LiDAR introduced?

20 **A.** This past year, 2020.

21 **Q.** And I believe you touched on this in your description, but
22 is it relevant to game developers?

23 **A.** I think so. As game developers start to create new AR
24 experiences, having this level of performance for recognizing
25 the environment is extremely helpful.

1 Q. And I believe we've learned over the last two weeks that
2 AR is augmented reality?

3 A. Yes.

4 Q. And, sir, I'd like to show you a brief demonstrative on
5 the LiDAR technology, and that's currently on the screen.

6 And if you could please narrate this for the Court.

7 (Demonstrative published.)

8 THE WITNESS: Sure. This is an application called
9 magicplan. And you're pointing your phone at the walls and
10 doors and windows and floor of your space. And the LiDAR
11 scanner is making it very quick for the software to detect
12 those features of your space and automatically create a floor
13 plan that you can use for architecture, interior decorating,
14 whatever your project is.

15 BY MR. DOREN:

16 Q. Thank you.

17 And by the way, when was LiDAR included with iPhones?

18 A. 2020, this past fall.

19 Q. And this particular demonstrative we just watched, is that
20 from an app that's actually on the App Store?

21 A. Yes.

22 Q. And what's the name of that App?

23 A. Magicplan.

24 Q. Thank you.

25 Let's go back to our list. And finally, sir, in terms of

1 hardware, were any --

2 (Exhibit published.)

3 **BY MR. DOREN:**

4 **Q.** -- costs related to any of the improvements we just talked
5 about allocated to the App Store?

6 **A.** No.

7 **Q.** And let's go on now to the second tranche there, which is
8 cellular.

9 And first of all, what was the cellular connectivity of
10 the original iPhone based on?

11 **A.** It was called Edge which is a version of -- faster version
12 of 2G.

13 **Q.** And I seem to remember something called GSM would show up?

14 **A.** Well, GSM is the global standard for 2G, which Edge was --
15 which used. And so, yes, GSM was the technology.

16 **Q.** Thank you. Thank you.

17 And then in 2008, is that when 3G came into use?

18 **A.** It is.

19 **Q.** And then in 2012, did 4G or LTE come into use?

20 **A.** Yes.

21 **MS. FORREST:** Objection, Your Honor. Leading.

22 **MR. DOREN:** Just trying to move things along. I'm
23 happy to slow down, Your Honor.

24 **THE COURT:** All right. Let's change the form.

25 **MR. DOREN:** Yes, ma'am.

1 Q. Mr. Schiller, can you -- can you walk us through, please,
2 the evolution of cellular connectivity since the opening of
3 the App Store?

4 A. Sure. Apple didn't invent cellular networks. Of course
5 there are many companies involved in these technologies. But
6 our teams had a lot of work to do to bring them out in a way
7 that worked well for our customers.

8 We started with GSM technology. And 2G was a -- the first
9 generation of GSM that we included with our iPhone.

10 In 2008 we added 3G and brought that into the network,
11 into the cellular.

12 We also brought out a format called CDMA, which was a --
13 Verizon used separate from GSM. So we had support for both
14 across our line with iPhone as well.

15 And then in 2012, the next generation came into iPhone
16 called LTE, stands for long-term evolution. But it's 4G
17 technology.

18 And, you know, I would note the qualitative difference.
19 With 3G, we really now had the ability to, you know, surf the
20 web and a lot more data capability than 2G had, started to get
21 a lot more interesting for all of us as we travel around.

22 With 4G and LTE, as we know, now we're able to start
23 streaming TV shows and movies, we're able to do FaceTime video
24 calls. It's much more capable for the types of things we've
25 all been used to for the last few years.

1 And in this past year with iPhone, we've implemented the
2 latest standard which is 5G. We're pretty early in the
3 development of 5G technologies. A lot of hopes for the
4 future. With 5G you get even more performance depending on
5 location. You get more bandwidth. So that means that all the
6 situations we've been used to where we get to a stadium or
7 busy university and you can't get a good data connection,
8 hopefully that will be dramatically reduced with the bandwidth
9 of 5G.

10 So those are some of the steps of cellular technology.

11 **Q.** And to state the obvious, Apple didn't invent these
12 different -- these different tiers of the connectivity,
13 correct?

14 **A.** No, we did not.

15 **Q.** But was engineering work involved at Apple in order to
16 take advantage of them?

17 **A.** Oh, yes, as a -- a huge team that has to engineer both the
18 hardware and the software, as well as test it, on every
19 carrier network around the world.

20 **Q.** And was the cost of any of that engineering work charged
21 to the App Store, sir?

22 **A.** No.

23 **Q.** And -- and as -- as the Apple devices move through and
24 evolve with the cellular connectivity, does -- did the Apple
25 devices simply abandon the preexisting technology?

1 **A.** No. I think one of the subtle important things that --
2 that the engineers have worked so hard on is you actually,
3 with today's iPhone, get all of this. You get support for 5G,
4 4G, 3G, 2G. And each one has multiple bands that it runs on
5 around the world. So it's a -- a global phone for people to
6 travel.

7 So all of that is supported, in addition to other cellular
8 or wireless technologies, all the versions of Wi-Fi, all the
9 versions of Bluetooth, all running together in this one little
10 device.

11 **Q.** And is the evolution of cellular connectivity that's
12 occurred since 2008 relevant to game developers?

13 **A.** Absolutely.

14 **Q.** How so?

15 **A.** Well, I think we all love the idea of being able to play
16 high quality, highly rendered game experiences, multiplayer
17 experiences over wireless networks wherever we are.

18 **Q.** And we talked now about cellular connectivity. Are
19 these -- are cell phones also capable of Wi-Fi connectivity?

20 **A.** Yes, exactly.

21 **Q.** And how has that evolved over the years?

22 **A.** There are many versions of Wi-Fi that have come out over
23 the years that Wi-Fi's been given additional names with
24 letters so there's Wi-Fi a, Wi-Fi b, Wi-Fi n, and on and on.
25 And so we've been adding these through the years as well.

1 Q. And has that connectivity improved over time?

2 A. It has. With those updates, they increased performance
3 and increased range.

4 Q. And has that -- does that impact digital game developers?

5 A. Absolutely.

6 Q. And does that facilitate digital game transactions on iOS?

7 A. Sure. It helps to be able to be on a super-fast network
8 to download the latest games or latest update to features and
9 games.

10 Q. And let's go to the next demonstrative if we can.

11 (Demonstrative published.)

12 **BY MR. DOREN:**

13 Q. And first of all, sir, did there come a time when iPhones
14 began to use chips designed by Apple?

15 A. Yes.

16 Q. And when was that?

17 A. The first ones to ship with Apple chips in it was in 2010.

18 Q. And have those chips improved over the last ten years?

19 A. Oh, very much so.

20 **THE COURT:** And do I have these demonstrative? Or
21 not?

22 **MR. DOREN:** I will get them for you, Your Honor.

23 **THE COURT:** Does --

24 **MR. DOREN:** I apologize, Your Honor.

25 **THE COURT:** And Ms. Forrest, does she have them?

1 **MR. DOREN:** I hope she has them, but I will give them
2 to her again.

3 **THE COURT:** Thank you.

4 **MR. DOREN:** Thank you, Your Honor.

5 **BY MR. DOREN:**

6 **Q.** And Mr. Schiller, I'm looking at this demonstrative which
7 refers to various A series chips. What is an A chip?

8 **A.** It simply means, you know, it's an Apple-designed chip.

9 And all the chips we've put in our iPhone and most of our
10 iPads, we give a name that starts with an A.

11 **Q.** And how often are new A series chips issued?

12 **A.** Typically every year.

13 **Q.** And can you identify, looking at this graphic, some of the
14 more noteworthy moments in the evolution of Apple's chips?

15 **A.** Sure. It's -- you know, we think of computers as having a
16 CPU, a brain, right? That's traditional. But these are
17 actually much more than that. These are a complete system on
18 a chip. So it has many features to them which is why we'll
19 see through time that we've been adding features.

20 For example, in 2013, it was the first 64-bit chip. So
21 more bandwidth for higher performance applications. I
22 remember at the time many in the industry saying that this is
23 unnecessary in a phone, it didn't need this kind of
24 performance, why is Apple doing this. Now everybody's doing
25 64-bit chips. It's -- it's -- it is needed.

1 Supported Metal in 2014, our graphics engine. As you see,
2 performance just got higher and higher.

3 2016 was the version we called the fusion chip, A10
4 fusion. That's because our engineers came up with a
5 methodology of having these -- these CPU cores in different
6 sizes. A "P" core meant a performance core, and an "E" core
7 was an efficiency core. So we had multiple cores running your
8 software, developer software, at the same time and
9 dynamically, with machine learning, figuring out whether an
10 application needed the most performances or it could run in
11 high efficiency mode and save the user battery life.

12 In 2017, with our Bionic chip, a couple of big steps here.
13 We have the new generation graphic system, GPU, in the chip
14 designed by Apple. And this is the first time we had the
15 Neural Engine, which we spoke about the ability to run machine
16 learning on a dedicated segment inside the chip.

17 We also had the Secure Enclave, very important to user
18 privacy and security. The Secure Enclave is separate from the
19 rest of the chip. The rest of the chip can't get any
20 information out of it. But it's where -- where we store your
21 encryption keys for things like Face ID so that nothing can
22 ever decrypt and get at that data.

23 I just -- and with each year, it just gets faster and
24 faster and more and more efficient.

25 Q. And as I look at this, I also see periodic references to,

1 along with better processing power, longer battery life.

2 Has that been an ongoing effort over the last ten or
3 15 years?

4 **A.** Absolutely. We have these conflicting goals of trying to
5 deliver more performance, more features and capabilities,
6 while also making the battery life longer, not shorter.

7 And one of the things that helps with that, you'll see a
8 few notes in here of what's called process technology. Like
9 2018, it's the first 7-nanometer chip. "7-nanometer" refers
10 to the process it's made on in a fabrication factory, and
11 7-nanometer means you could pack more of the chip into a
12 smaller die size which gives you more features while also
13 being more energy efficient.

14 **Q.** And I also see, as we look through here, kind of a steady
15 efforts or steady improvement in terms of upgraded graphics.
16 Is that the case?

17 **A.** Always, yes.

18 **Q.** And we see, for example, in 2015 the A9 chip was
19 90 percent faster than the AA chip, correct?

20 **A.** That's right.

21 **Q.** And then in 2018, the A12 chip was once again 50 percent
22 faster than the A11 Bionic chip; is that right?

23 **A.** Yes. These are huge steps. We're all used to, you know,
24 general personal computer technology where each year you might
25 hear about 4 percent, 6 percent, 8 percent faster. Seeing

1 50 percent or 90 percent is pretty dramatic over a yearly
2 increase.

3 Q. And so if we're speaking in terms of just pure processing
4 power, if you will, or processing speed, from 2010 to 2020,
5 how -- how far has that advanced?

6 A. The rough numbers I've been able to get from our chip
7 engineering team in terms of an estimate calculation is that
8 from a CPU, core processing performance, over a decade it's
9 increased 100 times, one hundredfold.

10 Q. Not 100 percent?

11 A. No, one hundredfold.

12 Q. And what about this -- this kind of constant push on
13 graphics, what has occurred with graphic speed over that same
14 period?

15 A. In over that same period, the rough estimate of -- of
16 relative graphic performance I've heard is one thousandfold.

17 Q. One thousandfold?

18 A. Yes.

19 Q. And is that -- are those two improvements, shall we say,
20 those two improvements in leaps and bounds, are those relevant
21 to game developers?

22 A. Certainly.

23 Q. And again, in what way, sir?

24 A. Well, obviously being able to play the kinds of quality
25 game experiences now that were not possible five or ten years

1 ago is something I think we see happening, and -- and it's
2 incredible because these game developers have such amazing
3 graphics and experience, but bringing them down to something
4 that fits in your pocket is -- is really becoming more and
5 more commonplace.

6 Q. And that would include Mr. Sweeney's game of Fortnite,
7 correct?

8 A. Sure.

9 Q. The game was launched on -- on the iPhone in about 2018.
10 Would it have been able to play -- would it have been able to
11 support that game much before then?

12 A. I think we'll have to ask them. But -- but certainly I
13 think at some point along this chart, something became
14 possible that wasn't before.

15 Q. Now, has Apple also continued to invest in the tools that
16 it provides to developers?

17 A. Yes.

18 Q. And how many API's did Apple make available to developers
19 with the first SDK in 2008?

20 A. I believe the number was something like 10,000.

21 Q. And how many API's are made available by Apple today?

22 A. In iOS, 150,000.

23 Q. And how often does Apple release new versions of software
24 development kits?

25 A. Often more than once a year.

1 Q. And are -- are new features included in each of those?

2 A. Yes, often.

3 Q. And are additional API's included in each?

4 A. Yes. Typically, on a yearly basis, it's anywhere from
5 1,000 up to 10,000 in some years.

6 Q. And just in general terms, can you tell us what sort of
7 things or what sort of changes are made in new SDK's?

8 A. Well, as we've discussed earlier, SDK's include the tools.
9 So we'll see new versions of our Xcode and performance
10 monitoring tools. We'll see these new API's for new features
11 that are coming on an annual basis. And we'll see
12 documentation to support starting to use those features and
13 help developers start to implement them on whatever their app
14 ideas are.

15 Q. Thank you.

16 If we could go to the next demonstrative, please.

17 (Demonstrative published.)

18 **BY MR. DOREN:**

19 Q. Sir, first of all, do you recognize what is reflected in
20 this demonstrative?

21 A. Yes.

22 Q. And can you describe it just at a high level?

23 A. These are a number of software building blocks and tools
24 that developers can use as they create their apps.

25 Q. And the first one, if you will, after the SDK symbol is

1 something called CoreMotion. Do you see that?

2 **A.** Yes, I do.

3 **Q.** And when was that made available by Apple?

4 **A.** In 2010.

5 **Q.** And what does CoreMotion do?

6 **A.** We spoke earlier about accelerometer, gyroscope, the
7 sensors that provide data about what the user is doing with
8 their phone. CoreMotion is the API a developer will use to
9 get that data and then use it in their application.

10 **Q.** And is that relevant to gamers?

11 **A.** I think so. I think moving your device around and
12 interacting with the -- the experience through effort of
13 motion is one way a developer could use input in a game.

14 **Q.** And does that make iOS a more attractive digital game
15 transaction platform?

16 **A.** I hope so.

17 **Q.** And the next item we see here is called SpriteKit. Do you
18 see that?

19 **A.** Yes.

20 **Q.** And when was that released by Apple?

21 **A.** In 2013.

22 **Q.** And what does SpriteKit do?

23 **A.** It is a library of tools for a developer who wants to ease
24 the process of creating animations within their game or app.

25 It creates -- you know, makes it easier for you to make

1 objects move in your app or have physics when things bump into
2 each other. SpriteKit handles those kind of interactions.

3 **Q.** And that 3D graphic or something else?

4 **A.** It's -- it's primarily focused on 2D graphics design.

5 **Q.** Thank you.

6 And the next item we see there is Metal. And we've heard
7 a fair amount about Metal in this trial. But can you tell us
8 from your perspective what Metal does?

9 **A.** Metal is a really big topic. It's a graphics toolkit for
10 developers from very simple application developed to very
11 advanced high-end application development for games, for
12 professional applications. And it allows a wide range of
13 capabilities for 3D graphics across everything from iPhone to
14 Apple TV to the Mac.

15 **Q.** And did you and your colleagues at Apple consider it to be
16 a material improvement over open GL?

17 **A.** Yes. That's what we used previous to Metal on iOS was
18 open GL and another technology called open CL for compute on
19 graphics. And we created something we think much more
20 powerful and -- and forward looking with Metal.

21 **Q.** And by the way, how -- why Metal? Why is that the name
22 used for the this API?

23 **A.** Yeah, the name is just a fun play on a term in technology
24 called "close to the metal." If you're a game developer,
25 especially more advanced ones, you want to feel like you're

1 programming very close to what your graphics chip is capable
2 of doing with very little getting in the way of that maximum
3 performance, and that's that term, "close to the metal."

4 Q. And did Apple work with developers in optimizing Metal?

5 A. We did.

6 Q. And did Apple work with Epic Games in optimizing Metal?

7 A. We did.

8 Q. Can you tell us about that collaboration?

9 A. Sure. Just before we were launching Metal, we brought in
10 a few of our best graphics engine game developers, and Epic
11 was one of those. And we asked them to come in and both get
12 feedback on it, learn about it before anyone else did, and to
13 see what they could do with it. They have incredible game
14 development there.

15 Q. And did, in fact, Epic do something incredible with it?

16 A. They did.

17 Q. And did you demonstrate Epic's work anyplace?

18 A. Yes. At our worldwide developer conference in 2014, we
19 invited Epic to take part and help us launch Metal.

20 Q. And who was the presenter on behalf of Epic?

21 A. Mr. Sweeney.

22 MR. DOREN: Your Honor, Exhibit DX3462 is a video of
23 the keynote from the 2014 WWDC. We don't want to play the
24 Court the entire 30-minute piece, but we do have perhaps a
25 20-second piece that we would like. And so I have that

1 separately on a thumb drive for the Court, and if we may play
2 it.

3 **THE COURT:** You may. It's in evidence.

4 And can I relieve the court reporter?

5 **MR. DOREN:** Yes, Your Honor. There's a transcript
6 in -- in the binder before the Court, and we'll make sure that
7 that's in the record as well.

8 **MS. FORREST:** No objection, Your Honor.

9 **THE COURT:** Okay. I'm sure she appreciates it.

10 Thank you.

11 Proceed.

12 (Video playing.)

13 **BY MR. DOREN:**

14 **Q.** And, sir, did you recognize that to be Mr. Sweeney giving
15 his comments on Metal in 2014 at the WWDC?

16 **A.** Yes.

17 **Q.** And -- and again, approximately how many people were there
18 in person to see him?

19 **A.** Six thousand in the audience.

20 **Q.** And how many people have viewed that presentation since?

21 **A.** Certainly many millions.

22 **Q.** And is that an opportunity that Apple provided to Epic
23 Games?

24 **A.** It is. And -- and I -- and I -- we should recognize they
25 created a great example that we were all excited about what

1 they were able to show the world could be done with Metal, and
2 we were proud to include them on our stage and have them take
3 part in it with us.

4 Q. And did you work with Epic to do something else with this
5 demonstrative after the WWDC?

6 A. Yeah. I recall we asked them if they could place it as
7 a -- a demo app on the App Store for users to see and
8 experience because it was so beautiful.

9 Q. And was that done?

10 A. I believe so, yes.

11 Q. Thank you.

12 Now, has Metal been improved since 2014?

13 A. Oh, yes.

14 Q. On how many -- how many new versions of Metal have been
15 released since then?

16 A. I believe we're up to Version 4 now.

17 Q. And does it be -- continue to become an increasingly
18 powerful graphics API?

19 A. Absolutely. We've added new capabilities, and actually
20 there's a built-in programming language, procedural language
21 in Metal. And there's advanced rate tracing capabilities that
22 are -- continue to advance. So it's -- yeah, we're moving it
23 ahead constantly.

24 Q. And is Metal relevant to game developers?

25 A. Absolutely.

1 Q. And is Metal relevant to the iOS devices becoming
2 increasingly attractive digital game transaction platforms?

3 A. It sure is.

4 Q. Now, sir, are you familiar with an API called GameplayKit?

5 A. Yes.

6 THE COURT: And, Mr. Doren, we've got three minutes,
7 just to let you know.

8 MR. DOREN: Thank you, Your Honor. I'll perhaps go
9 through this one more item. And then we --

10 Q. And, Mr. Schiller, when was GameplayKit made available by
11 Apple?

12 A. 2015.

13 Q. And what does GameplayKit do?

14 A. Well, it helps developers to make it easy for their games
15 to include the ability to track scores or show users'
16 achievements within their games, things you like to do with --
17 with helping encourage users to play your games.

18 Q. And as the name in your description implies, is that
19 specific to -- to games?

20 A. It is.

21 MR. DOREN: I think one more quick one, Your Honor.

22 Q. Mr. Schiller, ReplayKit, when was it released?

23 A. Also 2015.

24 Q. And what does ReplayKit do for developers?

25 A. It's popular with -- with gamers and certainly kids to

1 record their session of playing a game and then share it in
2 social media with their friends, show that they achieved
3 something in a level or how to win at a certain part of the
4 game.

5 And so ReplayKit helps a developer who wants to make that
6 a feature of their games to let their players share their
7 experiences with others around the world.

8 **Q.** And again, and this is an API specific for game
9 developers?

10 **A.** Yes.

11 **MR. DOREN:** That's a good breaking point, Your Honor,
12 if it works for the Court.

13 **THE COURT:** Okay.

14 We are going to stand in recess until tomorrow.

15 But I do have a -- not a -- I have a question for
16 Mr. Sweeney. He obviously doesn't need to be under oath for
17 this.

18 But, Mr. Sweeney, we've been in this trial now for over a
19 fortnight. Can you tell me where that name came from for you?
20 How did you come up with the name Fortnite for your game?

21 **THE CLERK:** Wait, I'll turn on the mic.

22 Hang on. Let me get. There's the mic.

23 **MR. SWEENEY:** Well, Fortnite came out of the Game
24 Jam. One week we gave every employee -- every employee at
25 Epic to experiment with building their own little game. And

1 one team built such an amazing little game that we turned it
2 into an official project.

3 And initially it had a day-night cycle. Every hour in
4 Fortnite, you go from day to night. And so the clock is
5 running 24 times faster. And so the two elements, the
6 experience we're building forts and having day and night
7 cycles with zombies coming out at night.

8 **THE COURT:** Okay. So fort-related as opposed to
9 fortnight, two-week related.

10 **MR. SWEENEY:** Exactly. Yeah, you built forts with
11 this building system, and that's how you defend yourself.

12 **THE COURT:** Okay.

13 I was just -- I had to ask. I figured I had you here,
14 wasn't going to have any other real opportunity to ask so why
15 not.

16 Okay. We'll stand in recess.

17 One thing. Again as we -- as we head to next week closing
18 down the trial, one -- one thing that I thought I wanted to
19 again run by the lead lawyers here. When I have jury trials,
20 I always meet with my jurors afterwards just to see what their
21 experience is like, see whether they enjoyed participating in
22 the jury process.

23 Obviously we don't have a jury here. But I did think that
24 if you're interested, and of course we would not talk about
25 anything case-related, happy to meet with your young

1 associates after the trial, maybe Tuesday morning. If you
2 each have a small group -- and not the partners, this is just
3 for the younger associates. I often meet with law students
4 and such, and thought maybe that would be a good opportunity
5 since they don't get to be up on the stand much. So --

6 **MR. DOREN:** That would be wonderful, Your Honor.

7 **MS. FORREST:** Your Honor, I absolutely agree. I'm
8 sure that our -- we'll select a group. Just tell us the
9 number that we can have and I'm sure that --

10 **THE COURT:** As long as it's equal.

11 **MS. FORREST:** Yeah.

12 **THE COURT:** And maybe --

13 **MS. FORREST:** Terrific.

14 **THE COURT:** -- maybe Tuesday morning they can come
15 for coffee or something like that.

16 **MS. FORREST:** Wonderful. Thank you very much.

17 **MR. DOREN:** Thank you, Your Honor.

18 **THE COURT:** Okay.

19 **MR. DOREN:** And, Your Honor, I've been asked whether
20 perhaps some junior in-house counsel could join as well.

21 **THE COURT:** Like I said, just make sure it's equal.
22 I'm happy to -- happy to meet with -- meet with a group.

23 And I do have to say --

24 **MR. DOREN:** Thank you.

25 **THE COURT:** -- I really am -- I said this before.

1 But I've presided over a number of antitrust cases where
2 literally this entire courtroom was filled with lawyers. And
3 I -- this case is so different. It still is striking to me,
4 the number of women, the diversity. And I do hope that you
5 take each of your teams and maybe take a picture and send the
6 picture off to the ABA or something like that.

7 Because given how many of these cases I've presided over,
8 this is very different than what I've seen in the past, and I
9 think it's a terrific example for the future.

10 **MR. DOREN:** Thank you, Your Honor.

11 **MS. FORREST:** Thank you very much, Your Honor.

12 **THE COURT:** Okay. We'll stand in recess until
13 tomorrow morning. Thank you.

14 You may step down.

15 (Proceedings were concluded at 3:18 P.M.)

16 --o0o--
17
18
19
20
21
22
23
24
25

CERTIFICATE OF REPORTERS

We, Diane E. Skillman, Pamela Batalo-Hebel, and Raynee Mercado certify that the foregoing is a correct transcript from the record of proceedings in the above-entitled matter. We further certify that we are neither counsel for, related to, nor employed by any of the parties to the action in which this hearing was taken, and further that we are not financially nor otherwise interested in the outcome of the action.

_____/S/DIANE E. SKILLMAN_____

Diane E. Skillman, CSR, RPR, FCRR

_____/S/ PAMELA BATALO-HEBEL_____

Pamela Batalo-Hebel, CSR, RMR, FCRR

_____/s/ Raynee Mercado_____

Raynee Mercado, CSR, RMR, FCRR

Monday, May 17, 2021